THAI FOR. BULL. (BOT.) 30: 124–166 2002.

An account of *Dalbergia* (Leguminosae-Papilionoideae) in Thailand

CHAWALIT NIYOMDHAM*

ABSTRACT. An account of the genus *Dalbergia* (Leguminosae-Papilionoideae) in Thailand is presented. Twenty-six species are described and illustrated. One new combination, *D. cana* var. *kurzii*, is proposed.

The following account of *Dalbergia* is presented as a precursor to the forthcoming Flora of Thailand treatment of this genus.

DALBERGIA

L.f., Suppl. Pl.: 52. 1781.

Trees, shrubs, scandent or woody climbers. *Leaves* alternate, imparipinate; stipules various, often small and usually caducous; stipels absent; leaflets chartaceous to coriaceous, alternate. *Flowers* small terminal and, or lateral panicles; bracts and bracteoles usually small, and caducous. *Calyx* campanulate, 5-lobed. *Corolla* ± exserted, white, yellow or purple or violet often fragrant; standard orbicular, oboval ovate to oblong, with well developed claw; wings free, oblong, narrowed or auriculate at base of blade. *Stamens* 9–10, monadelphous or diadelphous, slit on upper side, sometimes in 2 lateral bundles of 5 each, or only the vexillary one free: anthers small, erect, uniform, basifixed, usually twin, rarely single, opening at apex. *Ovary* stipitate, few-ovuled; style short, usually incurved; stigma small. *Pods* usually thin, indehiscent, oblong or strap-shaped, distinctly thickened or reticulation nerves more dense over the seed cavity, rarely thickened overall. *Seeds* reniform.

Distribution.— Pantropical, ca. 100 species. Twenty-six species in Thailand.

KEY TO THE SPECIES

Note: The length of the flower is measured from the calyx base to the corolla apex.

1. Tree
   2. Inflorescence terminal and sometimes in upper leaf axils
      3. Flowers up to 6 mm long. Standard petal including claw up to 5.5 mm long
         4. Leaflets oblong to lanceolate. Limb of standard petal oblong, ca. 5 by 3 mm, keel long-auriculate at base. Stipe of ovary glabrous or glabrescent **9. D. glomeriflora**
         4. Leaflets ovate to ovate-lanceolate. Limb of standard petal orbicular, ca. 3.5 mm diam., keel truncate at base. Stipe of ovary hairy **4. D. cochinchinensis**
      3. Flowers 8 mm or more long. Standard petal including claw over 6.5 mm long

*Forest Herbarium, Royal Forest Department, Bangkok 10900, Thailand.

5. Flowers ca. 8 mm long. Limb of standard petal narrowly obovate
6. Leaflets 2.5–4.5 by 1.5–2 cm wide, apex rounded, truncate to subemarginate. Pod glabrous, black when dry **15. D. nigrescens**
6. Leaflets 4.5–8 by 2.5–3.5 cm wide, apex acute to acuminate. Pod hairy, light brown when dry **2. D. cana**

5. Flowers over 10 mm long. Limb of standard petal broadly elliptic to orbicular
7. Leaflets obtuse to acute, often with an apiculate tip. Pericarp over the seed cavity very thick, prominently convex **16. D. oliveri**
7. Leaflets not as above. Pericarp over the seed cavity not as above **24. D. suthepensis**

2. Inflorescence only present in leaf axils
8. Flowers up to 5.5 cm long. Limb of standard petal 3–3.5 mm long. Anther single **5. D. cultrata**
8. Flowers over 7 mm long. Limb of standard petal 5–6 mm long. Anther twin
9. Leaflets orbicular. Limb of standard petal oblong. Calyx tube narrowly campanulate. Cultivated **D. sissoo Roxb.**
9. Leaflets ovate-oblong. Limb of standard petal orbicular. Calyx tube campanulate
10. Secondary nerves and reticulation of mature leaflet coarse and prominent on both surfaces when dry **13. D. lanceolaria**
10. Secondary nerves and reticulation of mature leaflet thin and fine, rather obscure on upper surface when dry **1. D. assamica**

1. Shrubs, scandent, woody climbers or sometimes tree-like, usually with spreading branches and thigmonastic or prehensile twigs
11. Flowers less than 5 mm long. Lower calyx teeth usually as long as or longer than the tube
12. Inflorescence in leaf axils. Leaflets 0.8–1.4 by 0.3–0.6 cm **10. D. darlacensis**
12. Inflorescence terminal. Leaflets larger
13. Leaves with 11 or more leaflets. Leaflet blade 1–2.5 by 0.5–1.5 cm. Lower calyx teeth ± as long as the tube **11. D. phyllanthoides**
13. Leaves with up to 9 leaflets. Leaflet larger. Lower calyx teeth longer than tube
14. Limb of standard petal narrowly oblong-obovate **12. D. entadoides**
14. Limb of standard petal broadly obovate to orbicular
15. Leaflets glabrous, rarely glabrescent on lower surface. Calyx glabrous or glabrescent. Plant of coastal habitats **13. D. parviflora**
15. Leaflets hairy on lower surface. Calyx hairy. Plant of inland habitats **14. D. rimosa**

11. Flowers 5.5 mm or more long, if less then calyx teeth shorter than the tube or limb of standard petal deeply divided at apex
16. Leaves with (3–)5–9 leaflets
17. Limb of standard petal narrow, oblong to oblong-obovate
18. Claw of standard petal short, not more than half as long as the limb
19. Pericarp thick, prominently thickened over the seed cavity **15. D. foliacea**
19. Pericarp thin, translucent, not thickened over the seed cavity **16. D. ovata**
18. Claw of standard petal longer, up to two-thirds or more as long as the limb
20. Leaflets elliptic-oblong, 5–12 by 3–7 cm; apex acuminate. Pod narrowly oblong, 6–7.5 cm long, 1.5–1.8 cm wide. Plant of inland habitats **17. D. rostrata**
20. Leaflets obovate, 1.5–5 by 1–3 cm; apex truncate or emarginate. Pod falcate, ca. 2.5 by 1 cm. Plant of riversides, estuaries and near mangrove margins **18. D. candenatansis**
17. Limb of standard petal broad, broadly elliptic, orbicular to reniform
21. Claw of standard petal up to half as long as the limb
22. Leaflets ovate-lanceolate, 8–13 by 3–5 cm; apex acute to acuminate. Inflorescence up to 1 cm long. Bracts and bracteoles persistent. Plant of riverside and estuary, not far from mangrove margins **19. D. menoeides**
22. Leaflets elliptic to oblong, 2–3 by 1.5–2 cm, apex obtuse. Inflorescence over 3 cm long. Bracts and bracteoles caducous. Plant of inland habitats **20. D. godefroyi**
21. Claw of standard petal more than half as long as the limb
23. Bracts and bracteoles persistent. Apex of leaflet obtuse to emarginate **Dalbergia sp. 1**
23. Bracts and bracteoles caducous. Apex of leaflet acute to acuminate, often with an apiculate tip **21. D. kingiana**

16. Leaves usually with more than 11 leaflets
24. Inflorescence terminal

25. Corolla bluish to lilac. Standard reniform, 4.5 by 6 mm. Twig and leaf dark brown to black when dry **22. D. volubilis**

25. Corolla white. Standard broadly obovate, 3.5 by 3.5 mm. Twig and leaf yellowish brown when dry **23. D. horrida** var. **glabrescens**

24. Inflorescence in leaf axils

26. Flower 6–7 mm long. Lower calyx teeth distinctly shorter than tube. Corolla whitish to yellowish

27. Limb of standard petal orbicular, ca. 2 mm in diam., claw ca. 2.5 mm long. Leaflets 1–2 by 0.5–0.8 cm, strongly unequally-sided at base, except for terminal leaflet **24. D. pinnata**

27. Limb of standard petal elliptic, ca. 4 by 3 mm, claw ca. 3 mm long. Leaflets 3–7.5 by 1.5–3 cm, equally to subequally-sided base **D. velutina**

26. Flower larger. Lower calyx teeth longer than tube. Corolla blue to violet **26. D. stipulacea**

1. Dalbergia assamica Benth., in Miq., Pl. Jungh. 2: 256. 1852; Baker, in Hook.f., Fl. Brit. Ind. 2: 235. 1876; Prain, J. As. Soc. Beng. 70(1): 52. 1901 & Ann. Roy. Bot. Gard. Calc. 10(1): 89. 1904; Kanjilal & al., Fl. Assam 2: 102. 1938; Ohashi in Hara, Fl. East. Himal. 148. 1966; Niyomdham & P.H. Hô, Adansonia 18: 138. 1996; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 42. 1997. Type: India, *Griffith* 546 (K!).— *D. balansae* Prain, J. As. Soc. Bengal 70(1): 54. 1901.— *D. lanceolaria* L.f. subsp. *lanceolaria* var. *assamica.* (Benth.) Thoth., Bull. Bot. Surv. Ind. 25: 171. 1983. Fig. 1.

Tree 15–30(–40) m high; young shoot, young leaves and inflorescence pubescent.*Leaves* 10–20 cm long; (9–)11–21 leaflets; petioles 2–6 cm long; rachis 8–15 cm long, pubescent to puberulous; stipules linear, ca. 5 by 1 mm long, very early caducous. *Leaflets* oblong to ovate-oblong, rarely obovate-oblong, the terminal one oblong to obovate-oblong, (2.5–)3–5 by 1–3 cm, puberulous on both surfaces; apex rounded; base cuneate to rounded; secondary nerves in 5–7 pairs, fine but distinct on both surfaces; tertiary nerves and reticulation fine, rather obscure on upper surface; petiolules 2–4 mm long. *Inflorescence* a panicle, in leaf axils, 5–8 cm long. *Bracts* and bracteoles small, very early caducous. *Pedicel* ca. 2.5 mm long. *Calyx* 4–5 mm long, puberulous. *Corolla* bluish; limb of standard petal orbicular, emarginate, ca. 5 mm in diam., claw ca. 1.5 mm; wings ca. 6 by 2.5 mm, claw ca. 1.5 mm; keel ca. 4 by 2 mm. *Stamens* 10, in 2 lateral bundles of 5+5. *Ovary* hairy; ovules 3–4. *Pod* oblong, 5–8 by 2–2.5 cm, glabrous, 1–2-seeded. *Seeds* reniform, ca. 3.5 by 5 mm, reddish-brown to dark brown.

Thailand.— NORTHERN: Chiang Mai, Lampang; SOUTH-WESTERN: Kanchanaburi; CENTRAL: Saraburi.

Distribution.— India, Myanmar, China, Laos and Vietnam.

Ecology.— Mixed deciduous forest, 50–800 m.

Vernacular.— Ket dam (เก็ดดำ) (Chiang Mai), ket deang (เก็ดแดง) (Lampang), kam pi (กำพี้), kra pi, (กระพี้) (Saraburi).

2. Dalbergia cana Grah. ex Kurz, J. As. Soc. Beng. 42(2): 70. 1873; Baker, in Hook.f., Fl. Brit. Ind. 2: 237. 1876; Kurz, For. Fl. Brit. Burma 1: 344. 1877; Prain, Ann. Roy. Bot. Gard. Calc. 10(1) 99. Pl. 84. 1904; Brandis, Ind. Trees: 237. 1921; Craib, Fl. Siam. Enum. 1: 474. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 22. 1997. Type: Myanmar, *Wallich* 5859 (K!).— *D. kerrii* Craib, Kew Bull. 1911: 43. 1911; Gagnep., Fl. Gén. I.-C. 2:

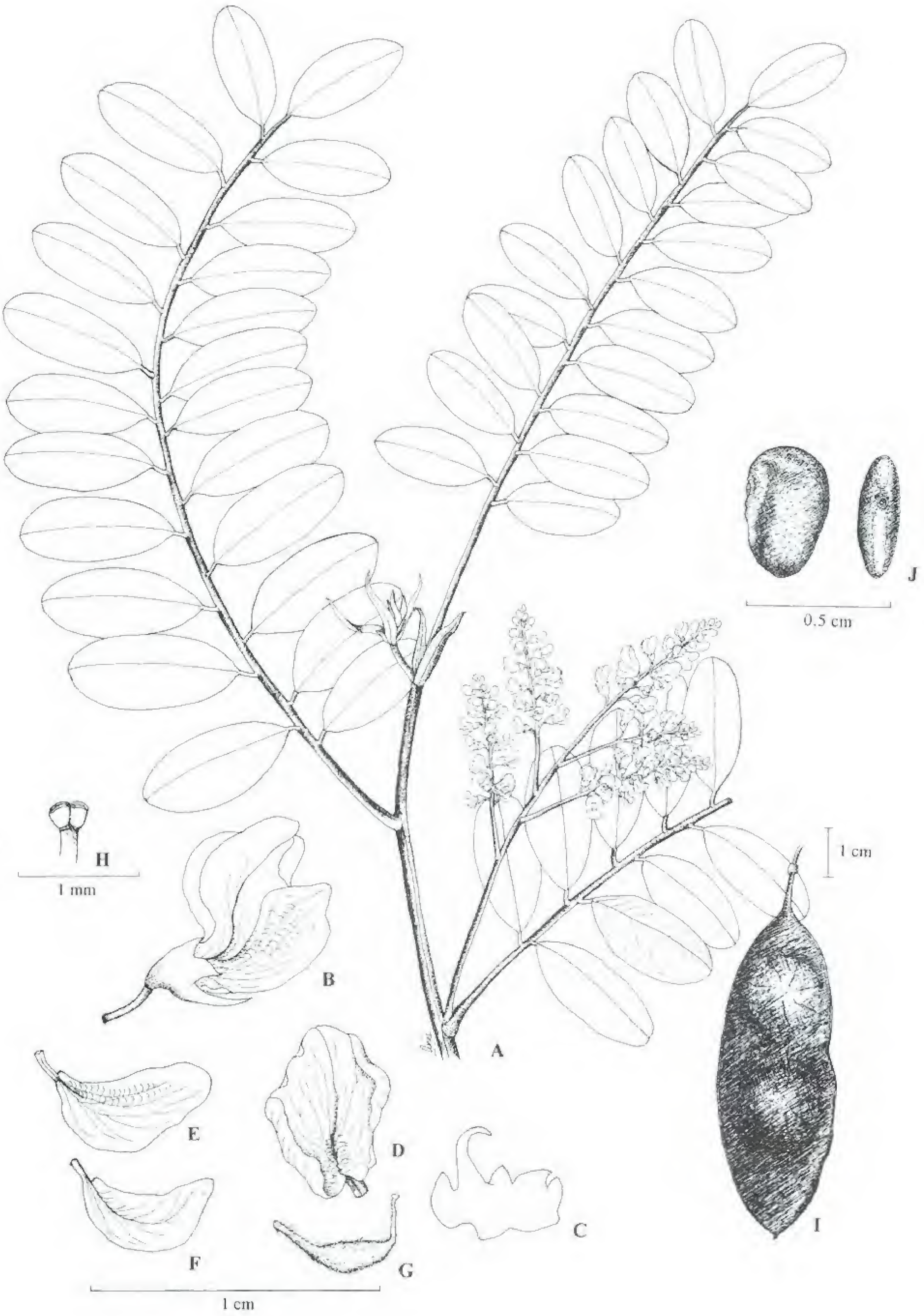

Figure 1. *Dalbergia assamica* Benth.: A. twig with leaves and inflorescence; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. anther; I. pod; J. seeds.

495. 1916; Craib, l.c. : 479. 1928.— *D. kurzii* Prain var. *truncata* Craib, l.c.: 480. 1928. Fig. 2.

KEY TO THE VARIETIES

Limb of standard petal narrowly obovate, longer than wings. Mature pod densely pubescent. Leaflets acute to acuminate at apex **a. var. cana**
Limb of standard petal obovate, as long as wings. Mature pod puberulous. Leaflets often obtuse at apex **b. var. kurzii**

2a. var. cana

Tree 15–30 m high; young shoot and inflorescence pubescent. *Leaves* 15–30(–45) cm long, with 15–19 leaflets; petioles 3–5 cm long; rachis 10–25(–35) cm long, pubescent; stipules oblong to linear-lanceolate, 1.5–2 by 0.5–1 cm, caducous. *Leaflets* oblong to lanceolate, rarely ovate, 4.5–8 by 2.5–3.5 cm, glabrous on both surfaces, except main nerves pubescent to puberulous; apex acute to acuminate; base round to obtuse; secondary nerves in 8–12 pairs, more distinct on lower surface; tertiary nerves more distinct on lower surface; petiolules 2–4 mm long. *Inflorescence* a panicle, terminal, 10–20 cm long. *Bracts* and bracteoles small, caducous. *Pedicel* ca. 3 mm long. *Calyx* ca. 4 mm long; tube glabrous to glabrescent; teeth hairy. *Corolla* purple; limb of standard petal narrowly obovate, emarginate, ca. 5 by 4 mm, claw ca. 2 mm long; wings ca. 4 by 2.5 mm, claw ca. 2.5 mm long; keel ca. 2.5 by 2.5 mm, claw ca. 2.5 mm long. *Stamens* 10, in 2 lateral bundles of 5 + 5; anthers single. *Ovary* and stipe hairy; ovules 1–2. *Pod* oblong, 5–7.5 by 2–2.5 cm, densely shortly hairy, 1–2-seeded. *Seeds* reniform, ca. 8 by 10.5 mm, reddish-brown.

Thailand.— NORTHERN: Mae Hong Son, Chiang Mai, Nan, Lampang, Phrae, Sukhothai, Tak, Phitsanulok, Uttaradit; NORTH-EASTERN: Phetchabun, Khon Kaen, Loei, Udon Thani; SOUTH-WESTERN: Kanchanaburi, Ratchaburi.

Distribution.— Myanmar and Laos.

Ecology.— Mixed deciduous forest, 400–1250 m.

Vernacular.— Kra phi (กระพี้), pi phong (ปี้พง), pi chan (ปี้จั่น) (Northern); kra phi chan (กระพี้จั่น), kra phi nang nuan (กระพี้นางนวล), kra phi lueang (กระพี้เหลือง) (Phitsanulok); kra phi phun (กระพี้พูน) (Uttaradit); kra phi lueap (กระพี้เหลือบ) (Phetchabun); kaling ping pa (กระลิงปิงป่า) (Ratchaburi); khet khao (เค็ดขาว) (Chiang Mai); chakkachan (จักจั่น) (Loei); pradu talen (ประดู่ตาหลน) (Sukhothai); i meng bai lek (อิเม็งใบเล็ก) (Udon Thani).

2b. var. kurzii (Prain) Niyomdham **comb. & stat. nov**.— *D. kurzii* Prain, J. As. Soc. Beng. 66(2): 450. 1897 & Ann. Roy. Bot. Gard. Calc. 10(1): 98, t. 83. 1904. Type: Myanamar, *Kurz* 2603 (K!).

Leaflets obtuse at apex. *Limb* of standard petals obovate, as long as wings. *Pericarp* of mature pod glabrescent.

Thailand.— NORTHERN: Mae Hong Son.

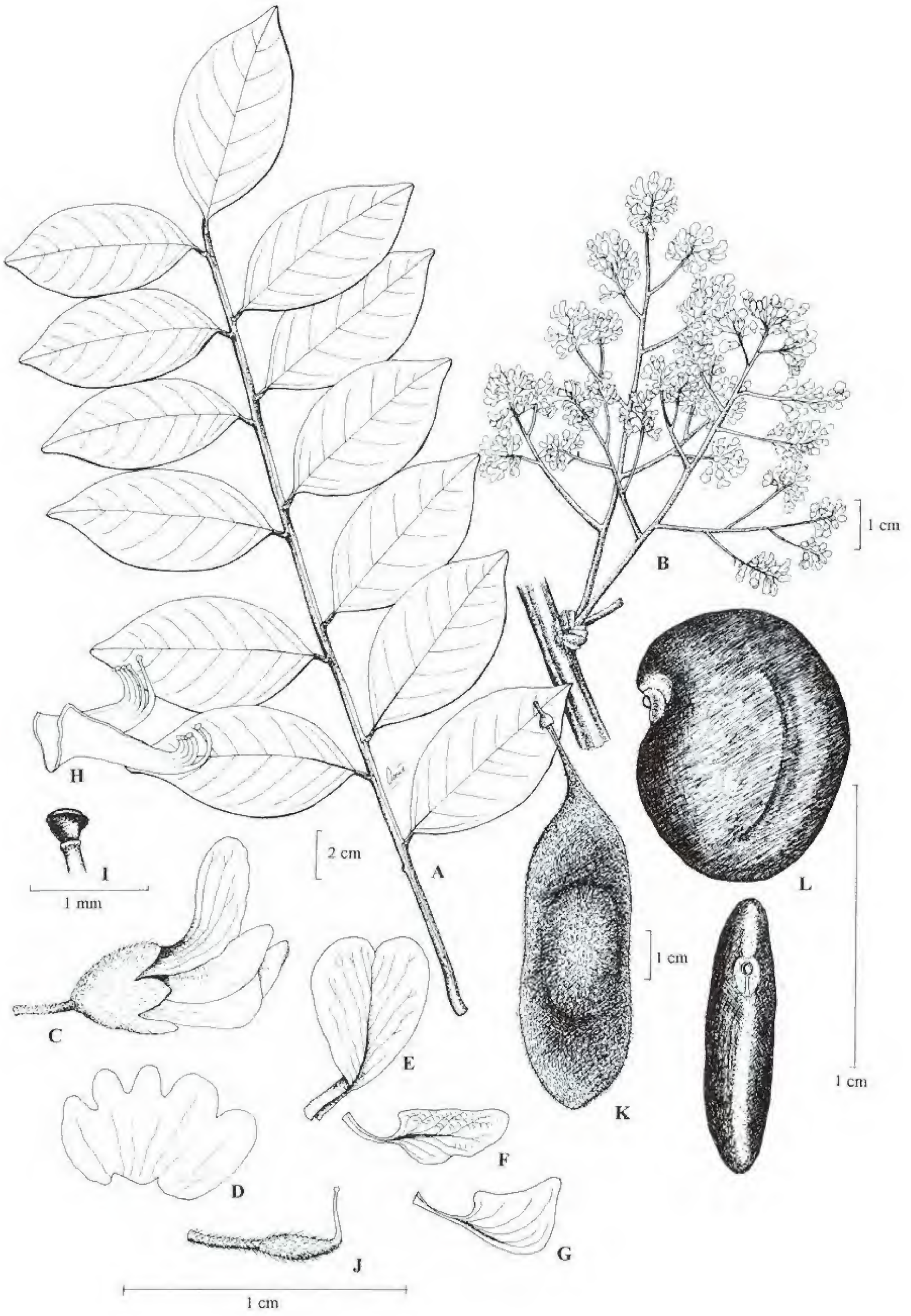

Figure 2. *Dalbergia cana* Grah. ex Kurz var. *cana*: A. leaf; B. inflorescences; C. flower; D. open calyx; E. standard petal; F. wing; G. keel; H. stamens; I. anther; J. ovary; K. pod; L. seeds.

Distribution.— Myanmar and Laos.

Ecology.— Mixed deciduous forest.

3. Dalbergia candenatensis (Dennst.) Prain, J. As. Soc. Beng. 70(1): 49. 1901; Gamble, Fl. Pres. Madras 383. 1918; Merr., En. Philip. Fl. Pl. 2: 294. 1923; Craib, Fl. Siam. Enum. 1: 475. 1928; Back. & Bakh.f., Fl. Java. 1: 614. 1963; Thoth., Tax. Revis. Dalbergieae Ind.: 187. 1987; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 45. 1997.— *Cassia candenatensis* Dennst., Schluss. Hort. Malab.: 32. 1818. Type from India.— *D. monosperma* Dalz., in Hook., J. Bot. 2: 36. 1850; Baker in Hook.f., Fl. Brit. Ind. 2: 237. 1876; Gagnep., Fl. Gén. I.-C. 2: 483. 1916.— *D. torta* Grah. ex Gray, Bot. U.S. Expl. Exped., Bot. 15(1): 458. 1854.— *Drepanocarpus monospermus* (Dalz.) Kurz, J. As. Soc. Beng. 45(4): 281. 1876. Fig. 3.

Scandent shrub or woody climber, 3–5 m long; young shoot and inflorescence puberulous to pubescent. *Leaves* 5–10(–15) cm long, with 5–7 leaflets; petioles 1–2 cm long; rachis 2–6(–10) cm long, glabrous to glabrescent; stipules small, caducous. *Leaflets* obovate, 1.5–5 by 1–3 cm; upper surface glabrous; lower surface puberulous; apex rounded, truncate to emaginate; base obtuse; secondary nerves thin, in 5–7 pairs, distinct on both surfaces; reticulation visible on lower surface; petiolules 1–3 mm long. *Inflorescence* an axillary raceme, 1–3(–5) cm long. *Bracts* ovate, ca. 0.8 by 0.5 mm, acute, persistent. *Bracteoles* elliptic, ca. 1.5 by 1 mm, persistent. *Pedicel* ca. 1.5 mm long. *Calyx* ca. 4.5 mm long, glabrous. *Corolla* white; limb of standard petal oblong, emarginate, ca. 3.5 by 2.5 mm, claw ca. 3 mm long; wings ca. 3.5 by 1.5 mm, claw ca. 3 mm long; keel ca. 4 by 2.5 mm, claw ca. 3 mm long. *Stamens* 10, in 1 bundle. *Ovary* glabrous; ovules 1–2. *Pod* falcate, ca. 2.5 by 1 cm, glabrous, 1-seeded. *Seeds* reniform, ca. 8 by 15 mm, reddish-brown.

Thailand.— SOUTH-WESTERN: Prachup Khiri Khan; SOUTH-EASTERN: Chon Buri, Trat; PENINSULAR: Chumphon, Ranong, Surat Thani, Satun, Songkhla, Narathiwat.

Distribution.— India, Sri Lanka, Bangladesh, Myanmar, China, Vietnam, Philippines to Australia.

Ecology.— Mangrove forest.

Vernacular.— Thao man priang (เถามันเปรียง), thao wan priang (เถาวัลย์เปรียง) (Surat Thani, Narathiwat); yan man priang (ยานมันเปรียง) (Narathiwat); sakkhi (สักขี) (Chumphon).

4. Dalbergia cochinchinensis Pierre, Fl. For. Cochinch. 5(24): t. 382B. 1898; Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 83, Pl. 64. 1904; Gagnep., Fl. Gén. I.-C. 2: 482. 1916; Craib, Fl. Siam. Enum. 1: 475. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 21. 1997. Type: Vietnam, *Pierre* 1710b (P!).— *D. cambodiana* Pierre, l.c.: t. 383. 1898; Prain, l.c.: 79, Pl. 60. 1904; Gagnep., l.c.: 496. 1916. Fig. 4.

Tree 15–30 m high; young shoot and inflorescence puberulous, later glabrous. *Leaves* 13–25 cm long, with 7–9 leaflets; petioles 2.5–5 cm long; rachis 6.5–15 cm long, glabrous; stipules small, caducous. *Leaflets* ovate to ovate-lanceolate, 3.5–8(–10) by 2–4(–5) cm,

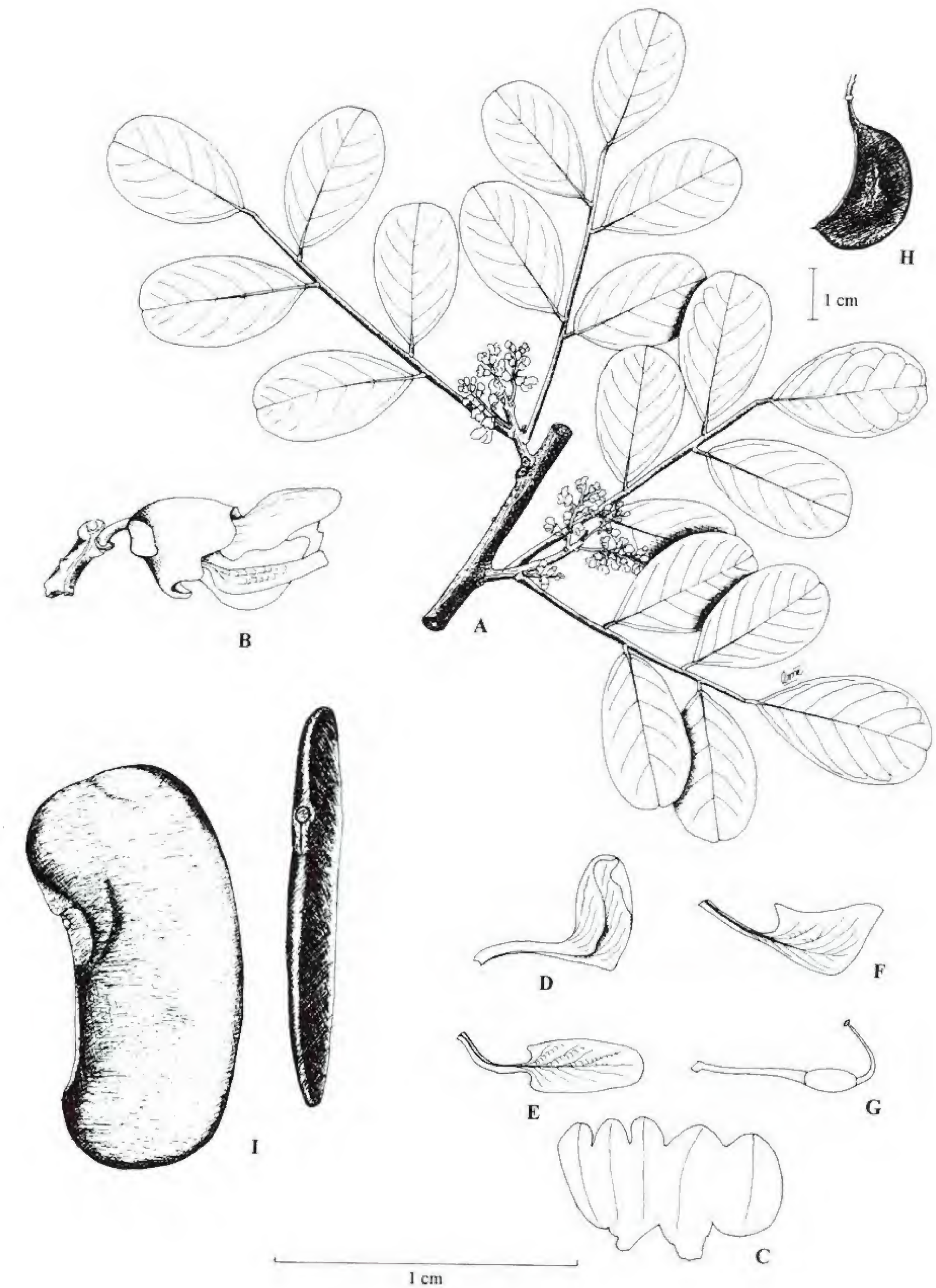

Figure 3. *Dalbergia candenatensis* (Dennst.) Prain: A. twig with leaves and inflorescences; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. pod; I. seeds.

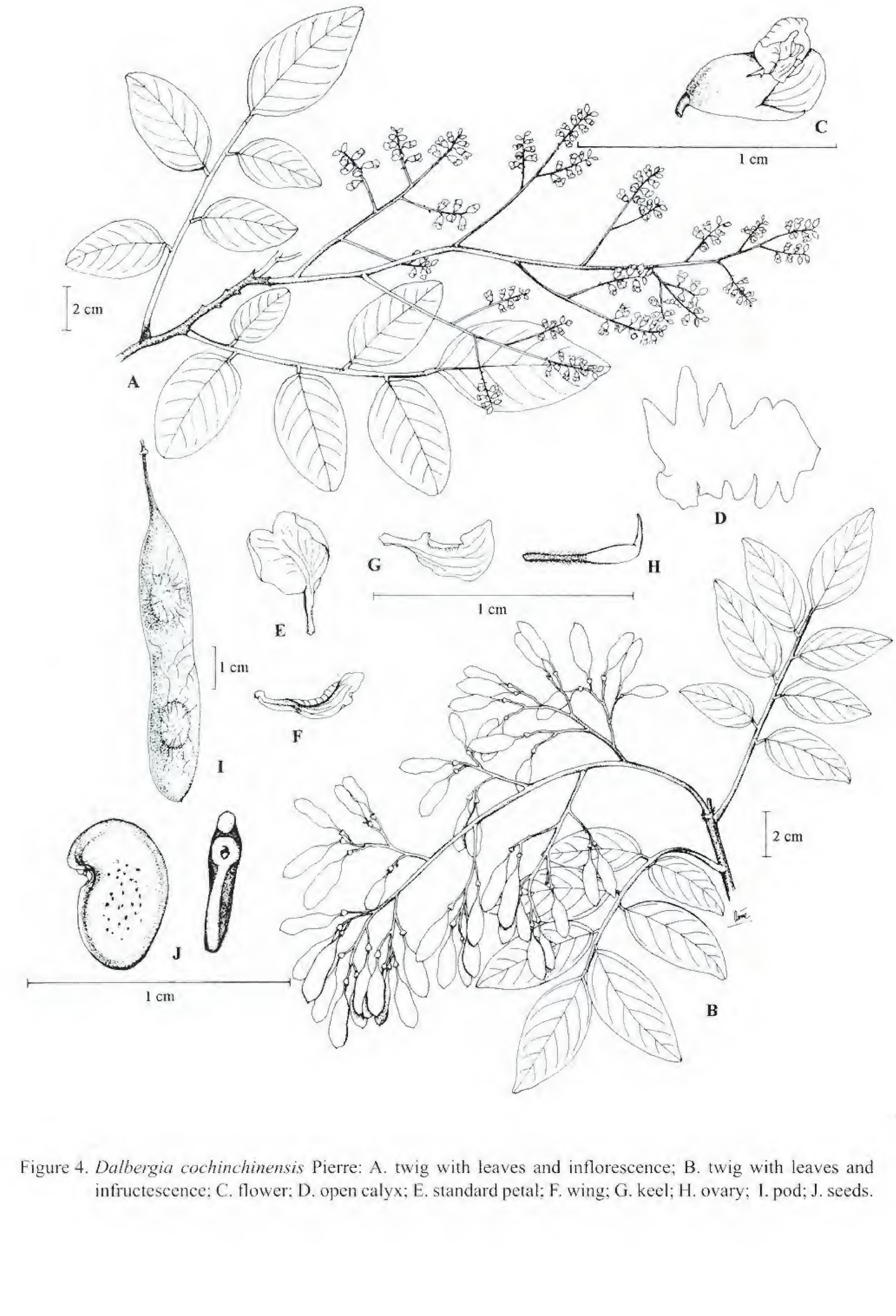

Figure 4. *Dalbergia cochinchinensis* Pierre: A. twig with leaves and inflorescence; B. twig with leaves and infructescence; C. flower; D. open calyx; E. standard petal; F. wing; G. keel; H. ovary; I. pod; J. seeds.

glabrous on both surfaces, apex acute, base obtuse to round; secondary nerves in 7–9 pairs, distinct on both surfaces; tertiary nerves and reticulation more distinct on lower surface; petiolules 2–5 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 10–20 cm long. *Bracts* and bracteoles small, very early caducous. *Pedicel* ca. 1 mm long. *Calyx* ca. 5 mm long, glabrous. *Corolla* whitish; limb of standard petal orbicular, ca. 3.5 mm in diam., claw ca. 1.5 mm long; wing oblong, ca. 3.5 by 1 mm, claw ca. 1.5 mm long; keel, ca. 3.5 by 2 mm, claw ca. 1.5 mm long. *Stamens* 10, in 1 bundle. *Ovary* glabrous; stipe hairy; ovules 4. *Pod* linear-oblong, 4.5–8 by 1 cm; pericarp very thin, fragile, light brown when dry, 1–4-seeded. *Seeds* reniform, ca. 4 by 6 mm, reddish-brown.

Thailand.— EASTERN: Surin, Ubon Ratchathani; CENTRAL: Saraburi; SOUTH-EASTERN: Sa Kaeo, Prachin Buri, Chachoengsao, Chon Buri, Rayong, Chanthaburi, Trat.

Distribution.— Laos, Cambodia and Vietnam.

Ecology.— In mixed deciduous and dry evergreen forest, 50–200 m.

Vernacular.— Kra–yong (กระยง), kra–yung (กระยุง) (Khmer-Surin); kha yung (ขะยุง) (Ubon Ratchathani); daeng chin (แดงจีน) (Prachin Buri); pradu tom (ประดู่ตม), pradu nam (ประดู่น้ำ) (Chanthaburi); pradu lai (ประดู่ลาย) (Chon Buri); pradu sen (ประดู่เสน) (Trat); pha yung (พะยูง) (General); phayung mai (พะยูงไหม) (Saraburi); hua–li–mo (หัวลีเมาะ) (Chinese).

5. Dalbergia cultrata Grah. ex Benth., in Miq., Pl. Jungh. 2: 254. 1852 & J. Linn. Soc.4 Suppl: 39. 1860; Baker, in Hook.f., Fl. Brit. Ind. 2: 233. 1876; Kurz, For. Fl. Brit. Burma 1: 342. 1877; Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 55, pl. 32. 1904; Brandis, Ind. Trees: 234. 1921; Gagnep., Fl. Gén. I.-C. 2: 481. 1916; Craib, Fl. Siam. Enum. 1: 475. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 52. 1997. Type: Myanmar, *Graham* in Wallich, Cat. no. 5861 (K!).— *D. cultrata* Grah. ex Benth. var. *pallida* Craib, l.c.: 476. 1928.— *D. fusca*. Pierre, Fl. For. Cochinch. 5(24) t. 381A. 1898; Prain, l.c.: 56, pl. 33. 1904; Gagnep., l.c.: 483. 1916; Craib, l.c. : 479. 1928. Fig. 5.

Tree 10–20 m high; young shoot and inflorescence puberulous to pubescent. *Leaves* 10–20 cm long; (9–)11–13 leaflets; petioles 2–3 cm long; rachis 7–12 cm long, glabrous to puberculous; stipules small, caducous. *Leaflets* elliptic-oblong, oblong to narrowly obovate, 3–5(–8) by 1.5–2.5(–4) cm; upper surface glabrous; lower surface glabrescent to pubescent; apex obtuse to emarginate; base obtuse to rounded; secondary nerves 9–12 pairs, thin but distinct on both surfaces; tertiary nerves and reticulation visible on both surfaces; petiolules 2–3 mm long. *Inflorescence* a panicle, in leaf axils of young shoots and upper leaf scars of old branches, 2–5 cm long. *Bracts* and bracteoles small, caducous. *Pedicel* ca. 1 mm long. *Calyx* ca. 4.5 mm long, glabrescent or glabrous. *Corolla* white; limb of standard petal broadly obovate to reniform, 3–3.5 by 3.5 mm, claw ca. 1.5 mm; wings ca. 2.5 by 1 mm, claw ca. 1.5 mm; keel ca. 2.5 by 1 mm, claw ca. 1.5 mm. *Stamens* 9, in 1 bundle. *Ovary* glabrous, or sometimes few hair along the sutures; ovules 3–4. *Pod* oblong, oblique, 5–8.5 by 1.5–2 cm, 1–2(–4)-seeded. *Seeds* reniform, ca. 8.5 by 12.5 mm, reddish-brown.

Thailand.— NORTHERN: Mae Hong Son, Chiang Mai, Chaing Rai, Nan, Lamphun, Lampang, Uttaradit, Tak; NORTH-EASTERN: Phetchabun, Loei, Udon Thani, Nakhon Phanom, Khon Kaen; EASTERN: Nakhon Ratchasima; SOUTH-WESTERN: Ratchaburi; Kanchanaburi; CENTRAL: Saraburi.

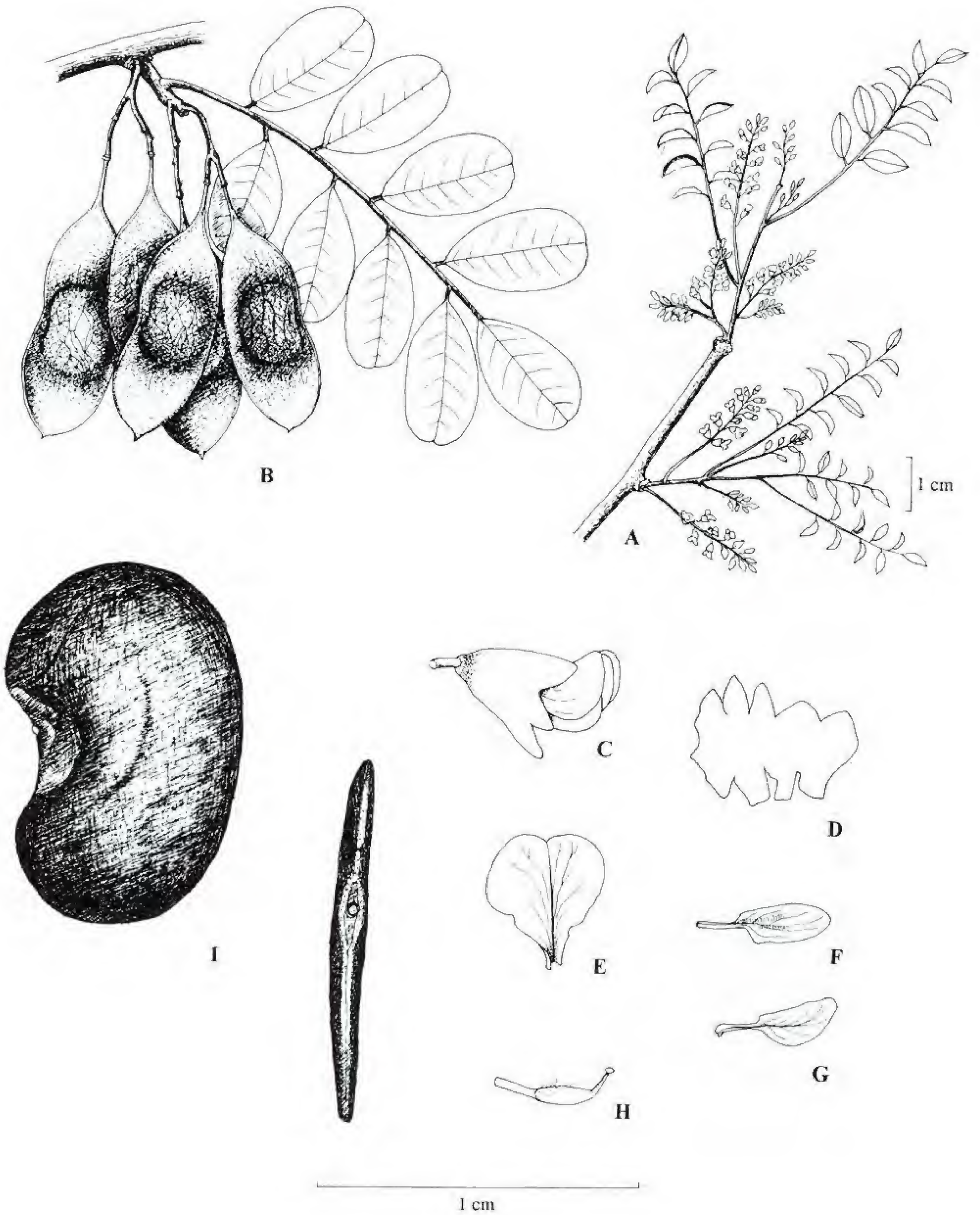

Figure 5. *Dalbergia cultrata* Grah. ex Benth.: A. twig with young leaves and inflorescences; B. twig with leaf and infructescences; C. flower; D. open calyx; E. standard petal; F. wing; G. keel; H. ovary; I. seeds.

Distribution.— Myanmar, Laos, Cambodia and Vietnam.

Ecology.— Mixed deciduous forest, 100–1300 m.

Vernacular.— Kra phi (กระพี้) (Central); kra phi khao khwai (กระพี้เขาควาย) (Udon Thani, Ratchaburi); ket khao khwai (เก็ดเขาควาย) (Northern); ket deang (เก็ดแดง) (Mae Hong Son, Lampang); ket dam (เก็ดดำ) (Kanchanaburi, Northern); kam phi (กำพี้), Ching chan (ชิงชัน) (Phetchabun); Kam phi khao khwai (กำพี้เขาควาย), daeng dong (แดงดง) (Loei); chak-chan (จักจัน), wiat (เวียด) (Shan-Chiang Mai); ma kham pa (มะขามป่า) (Chiang Mai); seng-phli-khlae (เส่งพลิแคละ) (Karen-Mae Hong Son); i meng bai mon (อีเม็งใบมน) (Udon Thani).

6. Dalbergia darlacensis P.H. Hô & Niyomdham, Adansonia 18: 139. 1996; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 32, pl. 5(1–7). 1997. Type Vietnam, S du Dac Lac, Poilane 32474 (P!).

Woody climber, up to 25 m long; young shoot and inflorescence pubescent. *Leaves* 9–15 cm long, with 25–31 leaflets; petioles 1–2 cm long; rachis 6.5–11 cm long, puberulous to pubescent; stipules small, caducous. *Leaflets* oblong, 8–14 by 3–6 mm; upper surface puberulous; lower surface pubescent; apex obtuse to retuse; base obtuse to truncate; secondary nerves in 5–7 pairs; tertiary nerves and reticulation inconspicuous; petiolules ca. 1.5 mm long. *Inflorescence* a panicle, in leaf axils, 4–6 cm long. *Bracts* and bracteoles oblong acute, ca. 1.5 by 1 mm, persistent. *Pedicel* ca. 2 mm long. *Calyx* ca. 2.5 mm long, pubescent. *Corolla* white; limb of standard petals broadly obovate, emarginate, ca. 4 by 4 mm, claw ca. 0.5 mm long; wings ca. 4 by 1.5 mm, claw ca. 1 mm long; keel ca. 4 by 1.5 mm, claw ca. 1 mm long. *Stamens* 9, in 1 bundle. *Ovary* glabrescent; ovules 2. *Pod* oblong, glabrous to glabrescent, 5.5–7.5 by 1.5–1.7 cm, 1(–2)-seeded. *Seeds* reniform, ca. 8 by 10 mm, reddish-brown.

Thailand.— NORTH-EASTERN: Loei.

Distribution.— China, Cambodia, Laos and Vietnam.

Ecology.— By streams in hill evergreen forest, 800–1300 m.

Vernacular.— Ma kham khruea (มะขามเครือ) (Loei).

7. Dalbergia entadoides Pierre ex Gagnep., Not. System. (Paris) 2. 295. 1913; Gagnep., Fl. Gén. I.-C. 2: 476. 1916; Craib, Fl. Siam. Enum. 1: 477. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 9. 1997. Type: Cambodia, *Pierre* 509 (P!).— *D. foliacea* auct. non Wall.; Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 54. 1904, p.p.

Scandent shrub 3–4 m high; young shoot and inflorescence pubescent. *Leaves* 10–12 cm long, with 5–9 leaflets; petioles 1.5–2.5 cm long; rachis 3–5 cm long, puberulous to pubescent; stipules small, caducous. *Leaflets* oblong to oblong-obovate, emarginate, 3–7 by 1.5–3.5 cm, glabrous on both surfaces, sometimes with a few scattered hairs on the main nerves; lateral nerves fine, in 8–10 pairs, distinct on both surfaces; reticulation very dense and visible on both surfaces; apex emarginate; base obtuse to rounded; petiolules,

1.5–2 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 7–15 cm long. *Bracts* and bracteoles reniform, ca. 0.5 by 1 mm, caducous. *Pedicel* ca. 0.5 mm long. *Calyx* ca. 2 mm long, glabrous. *Corolla* white; limb of standard petal oblong-obovate, emarginate, ca. 3 by 1.5 mm, claw ca. 0.5 mm long; wings oblong, ca. 2 by 1 mm, claw ca. 1 mm long; keel ca. 2 by 1 mm, claw ca. 1 mm long. *Stamens* 10, in 1 bundle. *Ovary* hairy on the upper suture; ovules 1–2. *Pod* 1–2-seeded, when 1-seeded, elliptic, ca. 2 by 1.5 cm, when 2-seeded oblong, ca. 3.5 by 1.5 cm. *Seeds* reniform, ca. 5 by 8 mm, dark brown.

Thailand.— NORTHERN: Nakhon Sawan; EASTERN: Surin, Si Sa Ket, Ubon Ratchathani; PENINSULAR: Songkhla.

Distribution.— Laos, Cambodia and Vietnam.

Ecology.— Usually found along riversides and by stream in mixed deciduous forest, 50–100 m.

Vernacular.— Kra phi (กระพี้) (Ubon Ratchathani).

8. Dalbergia foliacea Wall. ex Benth., in Miq., Pl. Jungh. 2: 255. 1852 & J. Linn. Soc. 4, Suppl.: 41. 1859; Baker, in Hook.f., Fl. Brit. Ind. 2: 232. 1876; Kurz, For. Fl. Brit. Burma 1: 347. 1877; Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 54, pl. 31. 1904, p.p.; Brandis, Ind. Trees 234. 1921; Craib, Fl. Siam. Enum. 1: 478. 1928. Type: Myanmar, *Wallich* 5856A (K!).— *D. rimosa* Roxb. var. *foliacea* (Wall. ex Benth.) Thoth., Bull. Bot. Surv. Ind. 25: 170. 1983. Fig. 6.

Scandent shrub, up to 10 m high; young shoot and inflorescence puberulous to pubescent, later glabrous. *Leaves* 15–25(–30) cm long, with 5–9 leaflets; petioles 3–6 cm long; rachis 8–15 cm long; stipules minute, very early caducous. *Leaflets* oblong to obovate-oblong, 5–12 by 2.5–6 cm; upper surface glabrous; lower surface puberulous to glabrous; apex often retuse or emarginate, sometimes rounded, or obtuse; base to rounded to obtuse; secondary nerves in 7–9 pairs; reticulation and areole distinct beneath; petiolules 2–3(–5) mm. *Inflorescence* a panicle, terminal and in upper leaf axils, 5–10(–15) cm long. *Bracts* broadly ovate-acute or triangular, ca. 0.5 by 1 mm, caducous. *Bracteoles* ovate-oblong, obtuse, ca. 1 by 0.5 mm, caducous. *Pedicel* 0.5–0.8 mm long. *Calyx* ca. 3.5 mm long, puberulous. *Corolla* creamy white to pale yellow; limb of standard petal oblong, ca. 3 by 2.5 mm, deeply devided at apex, claw ca. 1.5 mm long; wings ca. 3 by 1 mm, claw ca. 1.5 mm long; keel ca. 3 by 1.5 mm, claw ca. 1.5 mm long. *Stamens* 9, in 1 bundle. *Ovary* hairy at stipe and along the upper suture; ovules 2. *Pod* oblong, 6–8 by 2.5–3 cm, glabrous, 1(–2)-seeded. *Seeds* reniform, ca. 8 by 12 mm, reddish brown.

Thailand.— NORTHERN: Chiang Mai, Chiang Rai, Lampang, Tak, Sukhothai, Phitsanulok; NORTH-EASTERN: Phetchabun; EASTERN: Nakhon Ratchasima; SOUTH-WESTERN: Uthai Thani, Kanchanaburi, Ratchaburi; CENTRAL: Saraburi; SOUTH-EASTERN: Chon Buri.

Distribution.— India, Myanmar, Laos and Vietnam.

Ecology.— Margins of mixed deciduous forest and hill evergreen forest, 50–1400 m.

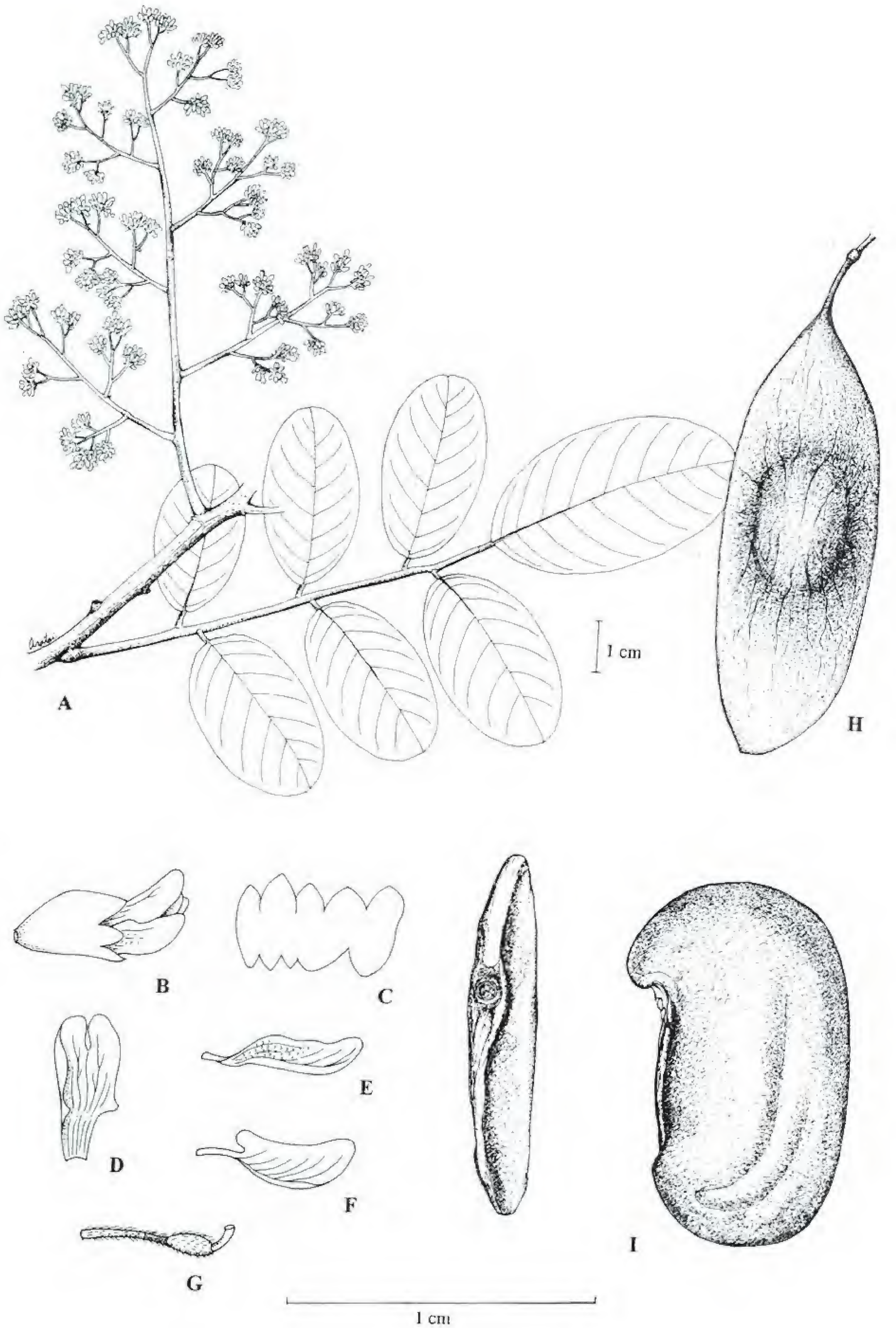

Figure 6. *Dalbergia foliacea* Wall. ex Benth.: A. twig with leaf and inflorescence; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. pod; I. seeds.

Vernacular.— Kra phi khruea (กระพี้อ่อน) (Kanchanaburi, Northern); saphi khruea (สะพี้เครือ) (Phetchabun); thon khruea (ถ่อนเครือ) (Nakhon Ratchasima); pradu laeng (ประดู่แล้ง) (Loei); hang lai thao (หางไหเถา) (Ratchaburi).

9. Dalbergia glomeriflora Kurz, J. As. Soc. Beng. 62(2): 70. 1873; Baker, in Hook.f., Fl. Brit. Ind. 2: 236. 1876; Kurz, For. Fl. Brit. Burma 1: 345. 1877; Prain, Ann. Roy. Grad. Calc. 10(1): 77, t. 6B. 1904; Brandis, Ind. Trees: 237. 1921; Craib, Fl. Siam. Enum. 1: 479. 1928. Type: Myanmar, *Kurz* 2611 (L!).— *D. lacei* Prain, Kew Bull. 1907: 58. 1907; Craib., l.c.: 480. 1928.— *D. ovata* Grah. ex Benth. var. *glomeriflora* (Kurz) Thoth., Bull. Bot. Sur. Ind. 25: 25. 1983. Fig. 7.

Tree 10–30 m high; young shoot pubescent. *Leaves* 15–30 cm long, with (7–)9–11 leaflets; petioles 2–4 cm long; rachis 10–20 cm long, glabrous to pubescent; stipules small, caducous. *Leaflets* oblong to lanceolate, 7–10 by 3–5 cm, glabrous on both surfaces or puberulous underneath, apex acute to acuminate, base obtuse to cuneate; secondary nerves thin, with 5–7 pairs visible on both surfaces; tertiary nerves and reticulation visible on both surfaces; petiolules 3–5 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 3–7 cm long. *Bracts* and bracteoles small, caducous. *Pedicel* ca. 2 mm long. *Calyx* ca. 5 mm long, glabrous. *Corolla* white; limb of standard petals oblong, ca. 5 by 3 mm, claw ca. 1 mm long; wings ca. 3.5 by 0.5 mm, claw ca. 1.5 mm; keel ca. 3.5 by 2 mm, claw ca. 1.5 mm long. *Stamens* 10, in 1 bundle. *Ovary* glabrous; stipe glabrous sometimes with a few scattered hairs; ovules 3–4. *Pod* oblong, 5–6 by 1.2–1.5 cm, glabrous, 1–3 seeded. *Seeds* reniform, ca. 4.5 by 6 mm, reddish-brown.

Thailand.— NORTHERN: Chiang Mai, Lampang, Nan, Sukhothai; NORTH-EASTERN: Udon Thani; SOUTH-WESTERN: Kanchanaburi.

Distribution.— Myanmar.

Ecology.— Scattered in open grassland and mixed deciduous forest, 100–800 m.

Vernacular.— Ket khao (เก็ดขาว), du roi (ดู่โรย) (Chiang Mai); du khao (ดู่ขาว) (Northern); du daeng (ดู่แดง) (Lampang).

10. Dalbergia godefroyi Prain, J. As. Soc. Beng. 70(1): 63. 1901 & Ann. Roy. Bot. Gard. Calc. 10(1): 103, pl. 88. 1904; Gagnep, Fl. Gén. I.-C. 2: 486. 1916; Craib, Fl. Siam. Enum. 1: 479. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 14. 1997. Type: Cambodia, *Godefroy* 288 (P!). Fig. 8.

Scandent shrub up to 10 m high; young shoot and inflorescence puberulous to pubescent. *Leaves* 5–10(–15) cm long, with 6–9 leaflets; petiole 1–2 cm long, rachis 3–7(–10) cm long, glabrous to puberulous; stipules minute, caducous. *Leaflets* elliptic to oblong, 2–3 by 1.5–2 cm, tomentose beneath when young, mature leaflets glabrous on both surfaces or scattered few hairs beneath; apex obtuse to rounded or slightly emarginate; base obtuse; secondary nerves rather close, fine, in 8–9 pairs, distinct on under surface; petiolules 1–1.5 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, (3–) 5–10 cm long. *Bracts* and bracteoles small, very early caducous. *Pedicel* ca. 2 mm long.

Figure 7. *Dalbergia glomeriflora* Kurz: A. inflorescence; B. twig with leaf and infructescence; C. flower; D. bracteole; E. open calyx; F. standard petal; G. wing; H. keel; I. stamens; J. anther; K. ovary; L. seeds.

Figure 8. *Dalbergia godefroyi* Prain: A. twig with leaves and infructescences; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. seed.

Calyx ca. 5 mm long, puberulous. *Corolla* whitish to orange; limb of standard orbicular to reniform, emarginate, ca. 4 by 5 mm, claw ca. 1 mm long; wings ca. 4.5 by 3 mm, claw ca. 1.5 mm long; keel ca. 3.5 by 2.5 mm, claw ca. 1.5 mm long. *Stamens* 10, in 2 lateral bundles of 5 + 5. *Ovary* hairy; ovules 4. *Pod* oblong to linear-oblong, falcate, 2–3.5 cm, finely velvety, 1–2(–3)-seeded, constricted between the seeds. *Seeds* reniform, ca. 6 by 10 mm, reddish-brown.

Thailand.— NORTHERN: Sukhothai; NORTH-EASTERN: Udon Thani; CENTRAL: Saraburi.

Distribution.— Cambodia.

Ecology.— By streams and riversides in mixed deciduous forest, 50–200 m.

11. Dalbergia horrida (Dennst.) Mabberley, Taxon 26: 538. 1977; Thoth. Taxon 30: 46. 1981.— *Amerimmon horridum* Dennst., Schluss. Hort. Malab.: 34. 1818.— *Dalbergia sympathetica* Nimmo, in Grahm. Cat. Bombay Pl.: 55. 1835; Voigt, Hort. Suburb. Calc.: 241. 1845; Benth., in Miq., Pl. Jungh. 2: 255. 1852 & J. Linn. Soc. 4, Suppl.: 42. 1860; Baker in Hook.f., Fl. Brit. Ind. 2: 234. 1876; Prain, J. As. Soc. Beng. 66(2): 446. 1897.— *D. multiflora* Heyne ex Prain, J. As. Soc. Beng. 70(1): 59. 1901 & Ann. Bot. Gard. Calc. 10(1) 43. pl. 18. 1904.

var. glabrescens (Prain) Thoth. & K.K.N. Nair, Taxon 30: 46. 1981; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 16. 1997.— *D. multiflora* Heyne ex Prain var. *glabrescens* Prain, J. As. Soc. Beng. 70(1): 59. 1901 & Ann. Roy. Bot. Gard. Calc. 10(1): 44. 1904; Gagnep., Fl. Gén. I.-C. 2: 476. 1916; Craib, Fl. Siam. Enum. 1: 44. 1928. Type from India.

Scandent shrub or woody climber, up to 20 m long; young shoot puberulous to pubescent, later glabrescent or glabrous. *Leaves* 6–12 cm long, with 11–15 leaflets; petioles 0.5–1.5 cm long; rachis 4.5–7 cm long, glabrescent; stipules small, caducous. *Leaflets* oblong to ovate-oblong, 1.5–3.5 by 0.7–1.8 cm; upper surface glabrous; lower surface glabrescent or glabrous; apex rounded, truncate to subemarginate; base rounded to obtuse, sometimes cuneate; secondary nerves in 8–10 pairs, thin, not prominent; tertiary nerves and reticulation more evident on lower surface; petiolules 1–2 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 5–10 cm long. *Bracts* and bracteoles oblong-obtuse, ca. 1.5 by 1 mm, persistent. *Pedicel* ca. 1 mm long. *Calyx* ca. 4 mm long, glabrescent. *Corolla* white; limb of standard petal broadly obovate, emarginate, ca. 3.5 by 3.5 mm, claw ca. 1 m long; wings ca. 3.5 by 1 mm, claw ca. 1 mm long; keel ca. 3 by 1 mm, claw ca. 1 mm long. *Stamens* 9, in 1 bundle. *Ovary* hairy along the sutures; ovules 2–4. *Pod* oblong, membranous, glabrous to glabrescent 5.5–6 by 2–2.5 cm, 1–2(–3)-seeded. *Seeds* reniform, ca. 6 by 10 mm, brown.

Thailand.— EASTERN: Ubon Ratchathani.

Distribution.— India, Cambodia, Laos and Vietnam.

Ecology.— Along margins and in open areas of mixed deciduous forest, 50–200 m altitude.

12. Dalbergia kingiana Prain, J. As. Soc. Beng. 67(2): 281. 1898 & ibid. 70(2): 46. 1901 & Ann. Roy. Bot. Gard. Calc. 10(1): 61, pl. 37. 1904. Type: Myanmar, Kachin Hills, *Henry* 12848 (E). Fig. 9.

Scandent shrub or woody climber up to 10 m long; young shoot and inflorescence pubescent to tomentose. *Leaves* 15–20 cm long, with 5–7 leaflets; petioles 1.5–2 cm long; rachis 6–8 cm long, puberulous to pubescent; stipule small, caducous. *Leaflets* oblong to obovate-oblong, 5–10 by 3–5 cm; upper surface glabrous; lower surface puberulous to pubescent; apex acute to acuminate; base obtuse to cuneate; secondary nerves in 10–12 pairs, visible on both surfaces but more distinct beneath; petiolules 3–5 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 5–8 cm long. *Bracts* and bracteoles small, very early caducous. *Pedicel* ca. 3 mm long. *Calyx* ca. 5 mm long, pubescent. *Corolla* white; limb of standard petal orbicular, ca. 3 mm diam., claw ca. 2.5 mm long; wings ca. 2.5 by 1 mm, claw ca. 3 mm long; keel ca. 3 by 1.5 mm, claw ca. 3 mm long. *Stamens* 9, in 1 bundle. *Ovary* and stipe with a few scattered hairs; ovules 2. *Pod* oblong, membranous, 7.5–8.5 by 2 cm, glabrous, 1–2 seeded. *Seeds* reniform, ca. 6 by 20 mm, reddish-brown.

Thailand.— NORTHERN: Chiang Mai; NORTH-EASTERN: Loei.

Distribution.— Myanmar.

Ecology.— Hill evergreen forest, 1500–1900 m.

13. Dalbergia lanceolaria L.f., Suppl. Plant.: 316. 1781; Benth., J. Linn. Soc. 4 Suppl.: 45. 1859; Baker, in Hook.f., Fl. Br. Ind. 2: 235. 1876; Francis & Hemsley, J. Linn. Soc. (Bot.) 23: 198. 1887; Prain, J. As. Soc. Beng. 70(1): 52. 1901 & Ann. Roy. Bot. Gard. Calc. 10(1): 33, pl. 76. 1904; Gagnep., Fl. Gén. I.-C. 2: 289. 1916; Brandis, Ind. Trees: 236. 1921; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 37. 1997.— *Amerimnon lanceolaria* (L.f.) O. Kuntze, Rev. Gén. Pl. 1: 152. 1891. Type: India, *Koenig Herb* 69 (L!).

KEY TO THE VARIETIES

1. Young shoot and inflorescence glabrous or nearly so. Lower calyx teeth subequal or slightly longer than the lateral ones **c. var. errans**
1. Young shoot and inflorescence pubescent. Lower calyx teeth much longer than the lateral ones
   2. Mature leaflets glabrous. Calyx puberulous **b. var. lanceolaria**
   2. Mature leaflets puberulous to pubescent. Calyx pubescent **a. var. lakhonensis**

13a. var. lakhonensis (Gagnep.) P.H. Hô & Niyomdham, Adansonia 18: 142. 1996; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 38. 1997.— *D. lakhonensis* Gagnep., Not. Syst. (Paris) 2: 296. 1913 & Fl. Gén. I.-C. 2: 489, fig. 46. 1916; Craib, Fl. Siam. Enum. 1: 480. 1928. Type: Thailand, Nakhon Phanom, Lakhon, *Thorel* s.n. (P!).— *D. lakhonensis* Gagnep. var. *appendiculata* Craib, l.c.: 480. 1928.— *D. maymyensis* Craib, Kew Bull. 1912: 390. 1912 & l.c: 481. 1928.— *D. maymyensis* Craib var. *siamensis* Craib, l.c.: 481. 1916.— *D. lanceolaria* L.f. subsp. *paniculata* var. *maymyensis* (Craib) Thoth., Bull. Bot. Surv., Ind. 25: 172. 1983. Fig. 10.

Figure 9. *Dalbergia kingiana* Prain: A. twig with leaf and inflorescences; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. stamens; H. ovary; I. pod; J. seed.

Young shoot and inflorescence densely pubescent. *Mature leaflets* pubescent on lower surface. *Calyx* densely pubescent. *Seeds* ca. 5 by 7.5 mm.

Thailand.— NORTHERN: Mae Hong Son, Chiang Mai, Chiang Rai, Phitsanulok, Lamphun, Phrae, Sukothai; NORTH-EASTERN: Nakhon Phanom, Mukdahan, Khon Kaen; EASTERN: Nakhon Ratchasima, Buri Ram, Surin, Ubon Ratchathani; SOUTH-WESTERN: Ratchaburi, Phetchaburi, Kanchanaburi; CENTRAL: Saraburi; SOUTH-EASTERN: Chon Buri.

Distribution.— Myanmar, Laos, Cambodia and Vietnam.

Ecology.— Mixed deciduous forest, 75–500 m.

Vernacular.— Pradong lueang (ประดงเหลือง) (Mukdahan); kra phi yuak (กระพี้หยวก) (Nakhon Ratchasima); kapi (กะปี) (Surin); khi mot (ขี้มอด) (Sukhothai); thon (ถ่อน) (Lamphun); i meng (อีเม็ง) (Ubon Ratchathani).

13b. var. lanceolaria

Tree up to 15–30 m high; young shoot and inflorescence puberulous to pubescent, later glabrescent to glabrous. *Leaves* (5–)10–20 cm long, (5–)7–9(–13) leaflets; petioles (1–)2–5 cm long; rachis (3–)7–15 cm long; stipules small, caducous. *Leaflets* ovate, elliptic to obovate or sometimes obovate-oblong, 2.5–5.5 by 2–3 cm, glabrous to glabrescent on both surface; apex rounded, emarginate; base rounded to obtuse; secondary nerves in 9–13 pairs, coarse and more prominent on upper surface; tertiary nerves and reticulation distinct on lower surface; petiolules (2–)3–5 mm long. *Inflorescence* a panicle, in leaf axils, 5–8 cm long. *Bracts* and bracteoles small, early caducous. *Pedicel* ca. 2 mm long. *Calyx* ca. 6 mm long, puberulous. *Corolla* bluish to purplish; limb of standard petal orbicular, ca. 6 mm in diam., claw ca. 2.5 mm long; wings ca. 6 by 3.5 mm, claw ca. 2.5 mm long; keel ca. 4 by 2.5 mm, claw ca. 2.5 mm. *Stamens* 10, in 2 lateral bundles of 5 + 5. *Ovary* glabrescent, stipe hairy; ovules 4. *Pod* lanceolate, 5.5–9 by 1.5–2 cm, rather thick with hard, coarse texture opposite the seeds, 1(–2)-seeded. *Seeds* reniform, ca. 5 by 8.5 mm, dark brown.

Thailand.— EASTERN: Nakhon Ratchasima; SOUTH-WESTERN: Kanchanaburi.

Distribution.— India, Myanmar, Sri Lanka.

Ecology.— Mixed deciduous forest. 50–400 m.

13c. var. errans (Craib) Niyomdham, Adansonia 18: 141. 1996; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 39. 1997.— *Dalbergia errans* Craib, Kew Bull. 1927: 381. 1927 & Fl. Siam. Enum. 1: 477. 1928. Type: Thailand, Loei, Phu Kradueng, *Kerr* 8643 (BK!, BM, K!).

Leaves glabrous to glabrescent when young, glabrous when mature. *Lower calyx teeth* ± as long as the other teeth. *Seeds* ca. 7 by 5 mm.

Thailand.— NORTHERN: Lampang, Uttaradit, Tak; NORTH-EASTERN: Loei.

Distribution.— Laos.

Ecology.— By stream in mixed deciduous forest, 150–400 m.

Vernacular.— Chingchan khao (ชิงชันขาว) (Tak); pradong daeng (ประดงแดง); mak lam daeng (หมักล่ำแดง) (Loei); pradu lai (ประดู่ลาย) (Lampang).

14. Dalbergia menoeides Prain ex King, J. As. Soc. Beng. 66(2): 120. 1897 & ibid. 70(2): 50. 1901 & Ann. Roy. Bot. Gard. Calc. 10(1): 64, pl. 41. 1904; Ridl., Fl. Mal. Pen. 1: 591. 1922.— *D. marcaniana* Craib., Kew Bull. 1924: 91. 1924 & Fl. Siam. Enum. 1: 481. 1928. Type: Myanmar, *Scortechini* 1392 (FI).

Woody climber up to 0.5 m high; young shoot and inflorescence pubescent. *Leaves* 10–20 cm long, 3–4(–5) leaflets; petioles 1–1.5 cm long, rachis 2.5–4 cm long, puberulous; stipulea small, caducous. *Leaflets* ovate-lanceolate, 8–13 by 3–5 cm; upper surface glabrous; lower surface puberulous; apex acute to acuminate; base obtuse to rounded; secondary nerves in 10–12 pairs, more distinct on upper surface (in dry specimens); tertiary nerves and reticulation distinct on upper surface; petiolules 2–3 mm long. *Inflorescence* in axillary racemes, up to 1 cm long. *Bracts* small, caducous. *Bracteoles* broadly ovate, ca. 2 by 2 mm, persistent. *Pedicel* 1–2 mm long. *Calyx* ca. 4 mm long, puberulous. *Corolla* white; limb of standard petal suborbicular, emarginate, ca. 5 mm diam., claw ca. 1.5 mm long; wings and keel ca. 5 by 2.5 mm, claws ca. 2 mm long. *Stamens* 10, in 1 bundle. *Ovary* glabrous; ovules 1. *Pod* semilunate, glabrous, ca. 3.5 by 2 cm (immature), 1-seeded. *Seeds* reniform.

Thailand.— CENTRAL: Bangkok.

Distribution.— Malaysia.

Ecology.— In tidal mud along with *Derris trifoliata* Lour.

15. Dalbergia nigrescens Kurz, in Pegu Rep. App. A48 & B. 45. 1875 & J. As. Soc. Beng. 45(4): 279. 1876 & For. Fl. Brit. Burma 1: 346. 1877; Gagnep, Fl. Gén. I.-C. 2: 494. 1916 p.p.; Craib, Fl. Siam. Enum. 1: 482. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 24. 1997. Type: Myanmar, Pegu, *Wight* 926 (K!).— *D. paniculata* auct. non Roxb.: Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 87. *Pl. 68*. 1904.— *D. lanceolaria* L.f. subsp. *paniculata* (Roxb.) Thoth., Tax. Revis. Dalbergieae Ind.: 147. 1987. Fig. 11.

KEY TO THE VARIETIES

1. Calyx tube and teeth densely pubescent. Pod 6.5–8 by 2.3–2.5 cm, prominently thickened over the seed cavity **b. var. nigrescens**
1. Calyx tube glabrous to puberulous, teeth pubescent. Pod smaller
   2. Pod 1.2–1.8 cm wide, prominently thickened over the seed cavity **a. var. anomala**
   2. Pod 1.2–1.3 cm wide, not thickened as above **c. var. saigonensis**

15a. var. anomala (Pierre) Niyomdham, Adansonia 18: 143. 1996; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 24. 1997.— *D. anomala* Pierre, Fl. For. Cochinch.

Figure 10. *Dalbergia lanceolaria* L.f. var. *lakhonensis* (Gagnep.) P.H. Hô & Niyomdham: A. twig with leaves and inflorescences; B. infructescence; C. flower; D. open calyx; E. standard petal; F. wing; G. keel; H. ovary; I. seeds.

5(24): pl. 381. 1898. Type: Vietnam, *Pierre* 1041b (P!).

Calyx glabrous to puberulous. *Pod* 5–8 by 1.5–1.8 cm. *Seeds* ca. 5.5 by 8.5 mm.

Thailand.— NORTHERN: Tak.

Distribution.— Cambodia and Vietnam.

Ecology.— Mixed deciduous forest, 350 m.

Vernacular.— Chanuan (ฉนวน) (Tak).

15b. var. nigrescens

Tree 10–20(–30) m high; young shoot and inflorescence pubescent. *Leaves* 10–20 cm long, with 9–15 leaflets; petioles 2–3 cm long, rachis 8–10 cm long, puberulous to pubescent; stipules small, caducous. *Leaflets* oblong to oblong-obovate, dark brown to black when dry, 2.5–4.5 by 1.5–2 cm; upper surface glabrous; lower surface glabrescent to puberulous; apex rounded to subemarginate, rarely obtuse; base rounded to obtuse; secondary nerves thin, in 7–9 pairs, visible on both surfaces; tertiary nerves and reticulation distinct on lower surface; petiolules 2–3 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, (3–)5–10 cm long. *Bracts* and bracteoles small, early caducous. *Pedicel* ca. 1.5 mm long. *Calyx* ca. 5 mm long, densely hairy. *Corolla* whitish; limb of standard petal narrowly obovate, emarginate, ca. 4.5 by 3 mm, claw ca. 2 mm long; wings ca. 5 by 2 mm long, claw ca. 2 mm long, keel ca. 3.5 by 2 mm, claw ca. 2 mm long. *Stamens* 10, in 2 lateral bundles of 5 + 5. *Ovary* hairy at base and along the sutures; stipe hairy; ovules 2–3. *Pod* oblong, 6.5–8 by 2.3–2.5 cm, black, 1–2-seeded. *Seeds* reniform, ca. 6.5 by 9.5 mm, dark brown to black.

Thailand.— NORTHERN: Chiang Mai, Lampang, Phayao, Phrae, Tak; NORTH-EASTERN: Loei.

Distribution.— Myanmar.

Ecology.— Scattered in mixed deciduous forest, 50–500 m.

Vernacular.— Kraphi (กระพี้) (Northern), cha nuan (ฉนวน), sanuan (สนวน) (General).

15c. var. saigonensis (Pierre) Gagnep., Fl. Gén. I.-C. 2: 494. 1916; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 27. 1997.— *D. saigonensis* Pierre, Fl. For. Cochinch. 5(24): pl. 381. 1898. Type: Vietnam, *Pierre* 222 (P!).

Calyx glabrous to puberulous. *Pod* 5.5–8 by 1.2–1.4 cm; pericarp over the seed cavity thin. *Seeds* ca. 4 by 6 mm.

Thailand.— NORTHERN: Chiang Mai, Lampang, Nakhon Sawan; NORTH-EASTERN: Loei, Udon Thani; EASTERN: Chaiyaphum, Nakhon Ratchasima; SOUTH-WESTERN: Uthai Thani, Kanchanaburi, Ratchaburi; SOUTH-EASTERN: Chanthaburi.

Distribution.— Cambodia and Vietnam.

Ecology.— Mixed deciduous forest.

Vernacular.— Kra phi (กระพี้) (Lampang); kra phi phrong (กระพี้โพรง) (Ratchaburi); cha nuan (ฉนวน), sa nuan (สนวน) (Central); hai pan chan (ไฮปันชั้น) (Lampang).

16. Dalbergia oliveri Gamble ex Prain, J. As. Soc. Beng. 66(1): 451. 1897 & Ann. Roy. Bot. Gard. Calc. 10(1). 92, pl. 75. 1904; Gagnep., Fl. Gén. I.-C. 2: 493. 1916; Brandis, Ind. Trees: 237. 1921; Craib, Fl. Siam. Enum. 1: 482. 1928; Niyomdham, P.H. Hô Hô & J.E. Vidal, Fl. C.L.V. 29: 30. 1977. Type: Myanmar, *Oliver* s.n. (K!).— *D. bariensis* Pierre, Fl. For. Cochinch. 5(24): pl. 380B. 1898; Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 96, Pl. 80. 1904; Gagnep., l..c.: 496. 1916; Craib, l.c.: 474. 1928.— *D. dongnaiensis* Pierre, l.c.: pl. 382A. 1898; Prain, l.c.: 97, pl. 81. 1904; Gagnep., l.c.: 492. 1916; Craib, l.c.: 477. 1928.— *D. duperreana* Pierre, l.c.: pl. 381B. 1898; Prain, l.c.: 97, pl. 82. 1904; Gagnep., l.c.: 497. 1916; Craib, l.c.: 477. 1928.— *D. mammosa* Pierre, l.c.: pl. 280A. 1898; Prain, l.c. : 96 pl. 79. 1904. Fig. 12.

Tree 15–30 m high; young shoot glabrous or glabrescent except for inflorescence puberulous to pubescent, later glabrous. *Leaves* 15–25 cm long, with (9–)11–13 leaflets; petioles 3–5 cm long; rachis 10–18 cm long; stipules small, very early caducous. *Leaflets* ovate-oblong to ovate-lanceolate, 4–8 by 1.5–3 cm, glabrous on both surfaces; apex obtuse to acute, often with an apiculate tip; base cuneate to rounded; secondary nerves in 9–12 pairs; tertiary nerves and reticulation distinct on both surfaces; petiolules 3–4 mm long. *Inflorescence* a panicle, terminal and subterminal, 10–15 cm long. *Bracts* and bracteoles small, very early caducous. *Pedicel* ca. 1 mm long. *Calyx* ca. 4.5 mm long, glabrous to glabrescent. *Corolla* lilac; limb of standard petal orbicular, emarginate, ca. 7 mm in diam., claw ca. 2 mm long; wings ca. 7 by 3.5 mm long, claw ca. 2 mm long; keel ca. 5 by 2.5–3 mm long, claw ca. 7 mm long. *Stamens* 10, in 2 lateral bundles of 5+5. *Ovary* hairy at base and along the sutures, stipe hairy; ovules 3–4. *Pod* lanceolate, 9–14 by 2.5–4 cm, glabrous, 1–2(–3)-seeded. *Seeds* reniform, ca. 9 by 12 mm, reddish-brown to dark brown.

Thailand.— All over the country.

Distribution.— Myanmar, Laos, Cambodia and Vietnam.

Ecology.— Mixed deciduous and dry evergreen forest, 100–700 m rarely up to 1500 m.

Venacular.— Krasip (กระซิบ), pradu sap (ประดู่สับ) (Surat Thani); ket (เก็ด), ket dam (เก็ดดำ) (Chiang mai); ket daeng (เก็ดแดง) (Chigna Mai); kam phi ton (กำพี้ต้น) (Phetchabun); du lai (ดู่ลาย) (Lampang); du sa daen (ดู่สะแดน) (Northern); chingchan (ชิงชัน), pradu chingchan (ประดู่ชิงชัน) (Central); phayung klaep (พยุงแกลบ) (Saraburi); phayung daeng (พะยูงแดง) (Phitsanulok); phayung hin (พะยูงหิน), anchan (อัญชัน) (Phetchabun); yun (ยูน) (Chanthaburi).

17. Dalbergia ovata Grah. ex Benth., in Miq., Pl. Jungh. 2: 254. 1852 & J. Linn. Soc. 4, Suppl.: 40. 1859; Baker, in Hook.f., Fl. Brit. Ind. 2: 231. 1876; Kurz, For. Fl. Brit. Burma 1: 343. 1877; Prain, J. As. Soc. Beng. 66(2). 443. 1897 & ibid.: 70(1): 43. 1901 & Ann. Roy. Bot. Gard. Calc. 10(1): 78, pl. 59. 1904; Gagnep., Fl. I.-C. 2: 474. 1916; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 20. 1997. Type: Myanmar, Mataban, *Wallich* 5854 (K!).— *D. floribunda* Craib, Kew Bull. 1927: 382. 1927 & Fl. Siam. Enum. 1: 478. 1928.— *D. forbesii* auct. non Prain: Gagnep., l.c.: 479. 1916. Fig. 13.

Figure 11. *Dalbergia nigrescens* Kurz: 1. var. *nigrescens*: A. twig with leaves and inflorescences; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. anther; H. ovary; I. pod; J. seeds. 2. var. anomala (Pierre) Niyomdham: K. pod. 3. var. saigonensis (Pierre) Gagnep.: L. pod; M. seeds.

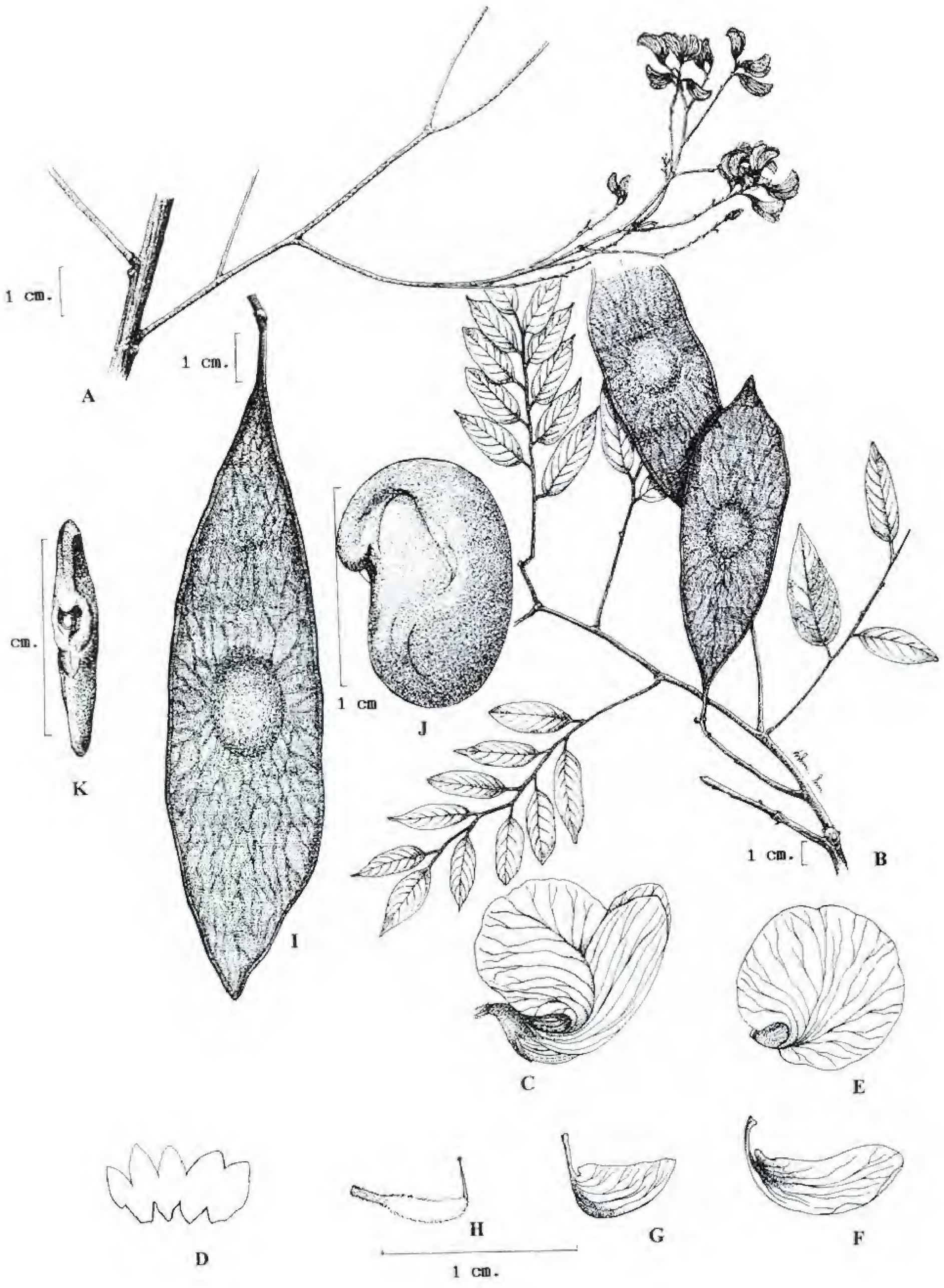

Figure 12. *Dalbergia oliveri* Gamble ex Prain: A. twig with inflorescence; B. twig with leaves and infructescences; C. flower; D. open calyx; E. standard petal; F.. wing; G. keel; H. ovary; I. pod; J. & K. seeds.

Scandent shrub or tree-like, usually with spreading branches and with thigmonastic or prehensile twigs, up to 10 m high; very young parts and inflorescence pubescent, later glabrous. *Leaves* 20–30 cm long, with (5–)7–9 leaflets; petioles 2–3 cm long; rachis 10–12 cm long; stipules small, caducous. *Leaflets* elliptic to obovate, sometimes orbicular, 8.5–16 by 3.5–6.5 cm, glabrous on both surfaces; apex abruptly acute to acuminate, rarely obtuse or rounded; base obtuse to rounded; secondary nerves in 8–10 pairs, prominent on both surfaces; tertiary nerves and reticulation more distinct on lower surface; petiolules 3–5 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 10–20 cm long. *Bracts* and bracteoles small, very early caducous. *Pedicel* ca. 1.5 mm long. *Calyx* ca. 5 mm long, glabrous or glabrescent. *Corolla* whitish; limb of standard petal obovate-emarginate, ca. 3.5 by 2 mm, claw ca. 2 mm long; wings ca. 3.5 by 1.5 mm, claw ca. 1 mm long; keel ca. 3.5 by 2 mm, claw ca. 1.5 mm long. *Stamens* 9, in 1 bundle. *Ovary* glabrous; ovules 2–4. *Pod* oblong to linea-oblong, membranous, 6–12.5 by 2 cm, glabrous, 1–2(–4)-seeded. *Seeds* reniform, ca. 7 by 11.5 mm, light brown.

Thailand.— NORTHERN: Chiang Rai, Nan, Lamphun, Lampang, Phrae, Uttaradit, Phitsanulok; NORTH-EASTERN: Phetchabun, Udon Thani, Loei; SOUTH-WESTERN: Kanchanaburi; CENTRAL: Saraburi; SOUTH-EASTERN: Chon Buri, Trat.

Distribution.— Myanmar, Laos and Vietnam.

Ecology.— Mixed deciduous forest, 50–400 m.

Vernacular.— Kam phi (กำพี้) (Uttaradit, Chiang Rai); khra yum (คร่ำหยุม) (Lampang); du khao (ดู่ขาว), dudong (ดู่ด้อง) (Phrae, Nan, Lampang); du daeng (ดู่แดง) (Lampang), du laeng (ดู่แล้ง) (Udon Thani); pradu talen (ประดู่ตะเลน), pradu bai khao (ประดู่ใบขาว) (Central).

18. Dalbergia parviflora Roxb., Hort. Beng. 98. 1814 & Fl. Ind. 3: 225. 1832; Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 34, pl. 8. 1904; Brandis, Ind. Trees: 237. 1921; Craib, Fl. Siam. Enum. 1: 482. 1928. Type from Moluccas.— *Drepanocarpus cumingii* Kurz non Benth., J. As. Soc. Beng. 45(2): 282. 1877 & For. Fl. Brit. Burma 1: 336. 1877. Fig. 14.

Scandent shrub up to 10 m high; young shoot and inflorescence puberulous, later glabrous. *Leaves* 10–20 cm long, 5–7(–9) leaflets; petioles 1.5–3 cm long; rachis (3–)4–6 cm long, glabrous; stipules small, caducous. *Leaflets* elliptic, oblong to obovate-oblong, 4–12 by 2–6 cm, glabrous on both surface; apex obtuse with a short blunt tip; base obtuse; secondary nerves in 10–12 pairs, thin, distinct on both surfaces; tertiary and reticulation close and dense, distinct on both surfaces; petiolules 3–5 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 5–10 cm long. *Bracts* ovate-acute, ca. 1 by 0.5 mm, persistent. *Bracteoles* oblong-obtuse, ca. 1.5 by 1 mm, caducous. *Pedicel* ca. 1.5 mm long. *Calyx* ca. 3 mm long, glabrous. *Corolla* white; limb of standard petal obovate-emarginate, ca. 2.5 by 2 mm, claw ca. 0.5 mm long; wings ca. 2 by 0.8 mm, claw ca. 0.5 mm long; keel ca. 2 by 1 mm, claw ca. 0.5 mm long. *Stamens* 10, in 1 bundle. *Ovary* hairy along the sutures; ovules 2–4. *Pod* falcate, 3–5 by 1.8–2 cm, 1–2(–4)-seeded. *Seeds* reniform, ca. 10 by 14 mm, reddish-brown.

Thailand.— PENINSULAR: Surat Thani, Phatthalung, Songkhla, Narathiwat.

Distribution.— Myanmar, Malaysia and Indonesia.

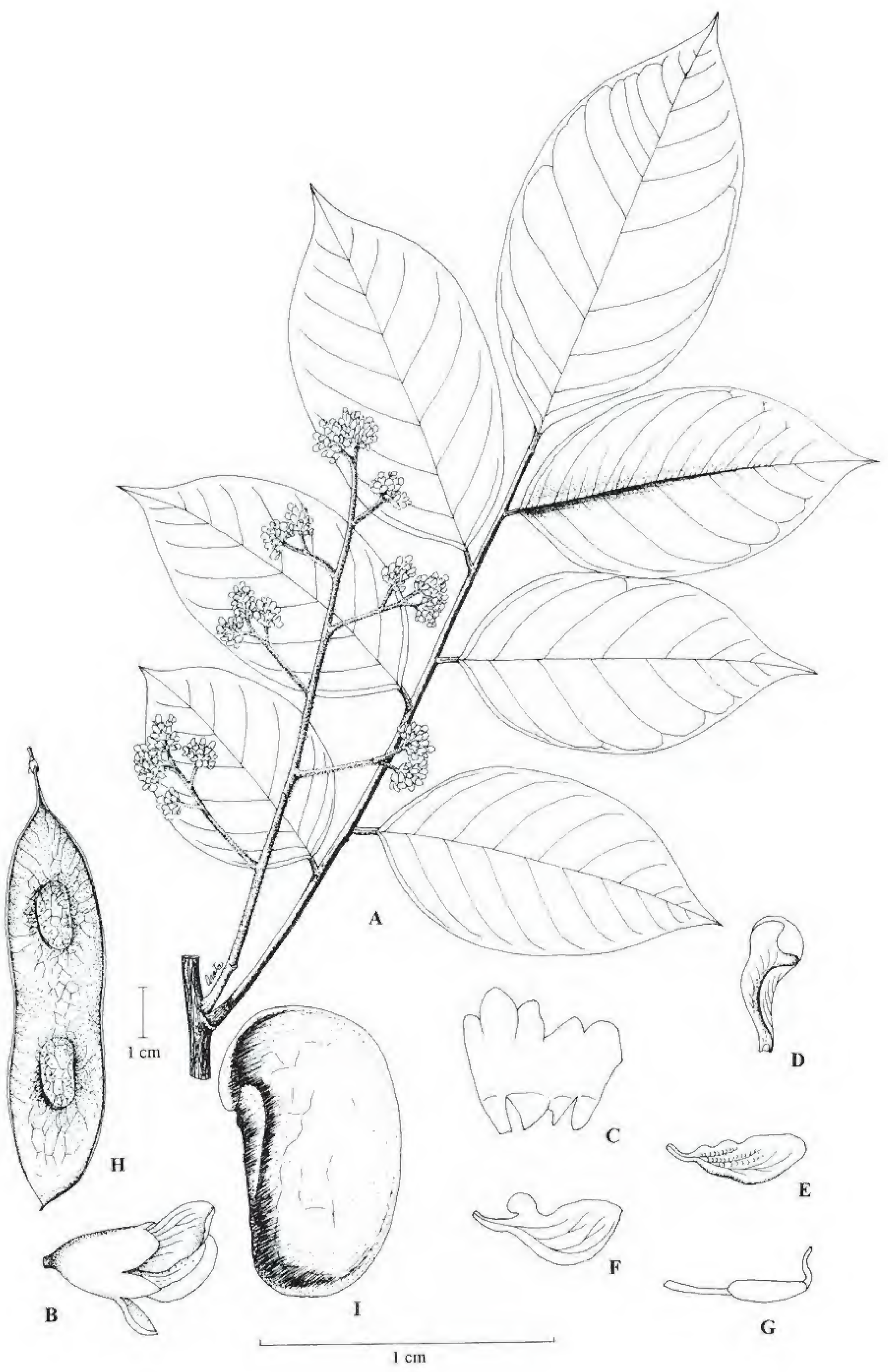

Figure 13. *Dalbergia ovata* Grah. ex Benth.: A. twig with leaf and inflorescence; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. pod; I. seeds.

Ecology.— Freshwater and brackish swamp forest, near sea level.

Vernacular.— Krasik (กระซิก) (Peninsular), Khri (ขรี), Sari (ครี้) (Surat Thani), Sakkhi (สักขี)(Narathiwat).

19. Dalbergia phyllanthoides Blume ex Miq., Fl. Ind. Bat. 1: 134. 1855; Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 44, pl. 19. 1904; Ridl., Fl. Mal. Pen. 1: 590. 1922. Type: from Java. Fig. 15.

Scandent shrub up to 5 m high; young shoot and inflorescence puberulous to pubescent. *Leaves* 5–15 cm long, with 11–15 leaflets; petioles 0.5–1.5 cm long; rachis 3–10 cm long, puberulous to pubescent; stipules small, caducous. *Leaflets* elliptic-oblong to oblong, obovate, 1–2.5 by 0.5–1.5 cm; upper surface glabrous; lower surface puberulous; apex rounded to truncate or submarginate; base rounded; secondary nerves in 6–9 pairs, visible on lower surface; petiolules 0.5–1 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 3–5(–9) cm long. *Bracts* ovate-acuminate, ca. 0.5 by 0.5 mm, persistent. *Bracteoles* ovate-acute, ca. 1 by 1 mm, persistent. *Pedicel* ca. 1.5 mm long. *Calyx* ca. 3 mm long, puberulous. *Corolla* white; limb of standard petal obovate, emarginate, ca. 3.5 by 3 mm, claw ca. 0.5 mm long; wings ca. 2.5 by 1 mm, claw ca. 1 mm; keel ca. 2 by 1 mm, claw ca. 1 mm long. *Stamens* 9, in 1 bundle. *Ovary* slightly puberulous along the sutures; ovules 1–3. *Pod* oblong, 5–9 by 2 cm, glabrous, 1–2-seeded (immature). *Seeds* reniform, ca. 5 by 8 mm, reddish-brown (immature).

Thailand.— PENINSULAR: Phatthalung, Trang, Songkhla, Narathiwat.

Distribution.— Malaysia, Indonesia.

Ecology.— Evergreen forest, 50–500 m.

20. Dalbergia pinnata (Lour.) Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 48. 1904; Merr, Philipp. J. Sci. (Bot.) 5: 96. 1910 & En. Philipp. Fl. Pl. 2: 296. 1923 & Trans. Amer. Phil. Soc., n.s., 24: 205. 1935; Back. & Bakh.f., Fl. Java 1: 614. 1963; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 44. 1997.— *Derris pinnata* Lour., Fl. Cochinch.: 432. 1790.— *Amerimnon pinnatum* (Lour.) O. Kuntze, Rev. Gén. Pl. 1: 159. 1891. Type from Vietnam.— *D. tamarindifolia* Roxb., Fl. Ind. 3: 233. 1832; Benth., in Miq. Pl. Jungh. 2: 256. 1852; Miq., Fl. Ind. Bat. 1: 131. 1855; Benth., J. Linn. Soc. 4, Suppl.: 44. 1860; Baker in Hook.f., Fl. Brit. Ind. 2: 234. 1876; Kurz in J. As. Soc. Beng. 45(4): 281. 1876 & For. Fl. Brit. Burma 1: 348. 1877; Prain, l.c.: 69. pl. 48. 1904; Gagnep., Fl. Gén. I.-C. 2: 485. 1916; Brabdis, Ind. Trees: 234. 1921; Ridl., Fl. Mal. Pen. 1: 591. 1922; Craib, Fl. Siam. Enum. 1: 483. 1928. Fig. 16.

Scandent shrub up to 5 m high; young shoot and inflorescence pubescent. *Leaves* 8–15 cm long, with 21–35 leaflets; petioles 0.5–1 cm long; rachis 4–12 cm long, pubescent; stipules small, caducous. *Leaflets* oblong, terminal leaflet obovate-oblong, 1–2 by 0.5–0.8 cm; upper surface glabrous; lower surface pubescent; apex rounded, truncate to subemarginate; base strongly unequal sided and cuneate, except in the terminal leaflet; secondary nerves many, thin, close, more evident on upper surface; petiolules very short. *Inflorescence* an axillary panicle, rarely subterminal, 2–3 cm long. *Bracts* ovate-acute, ca.

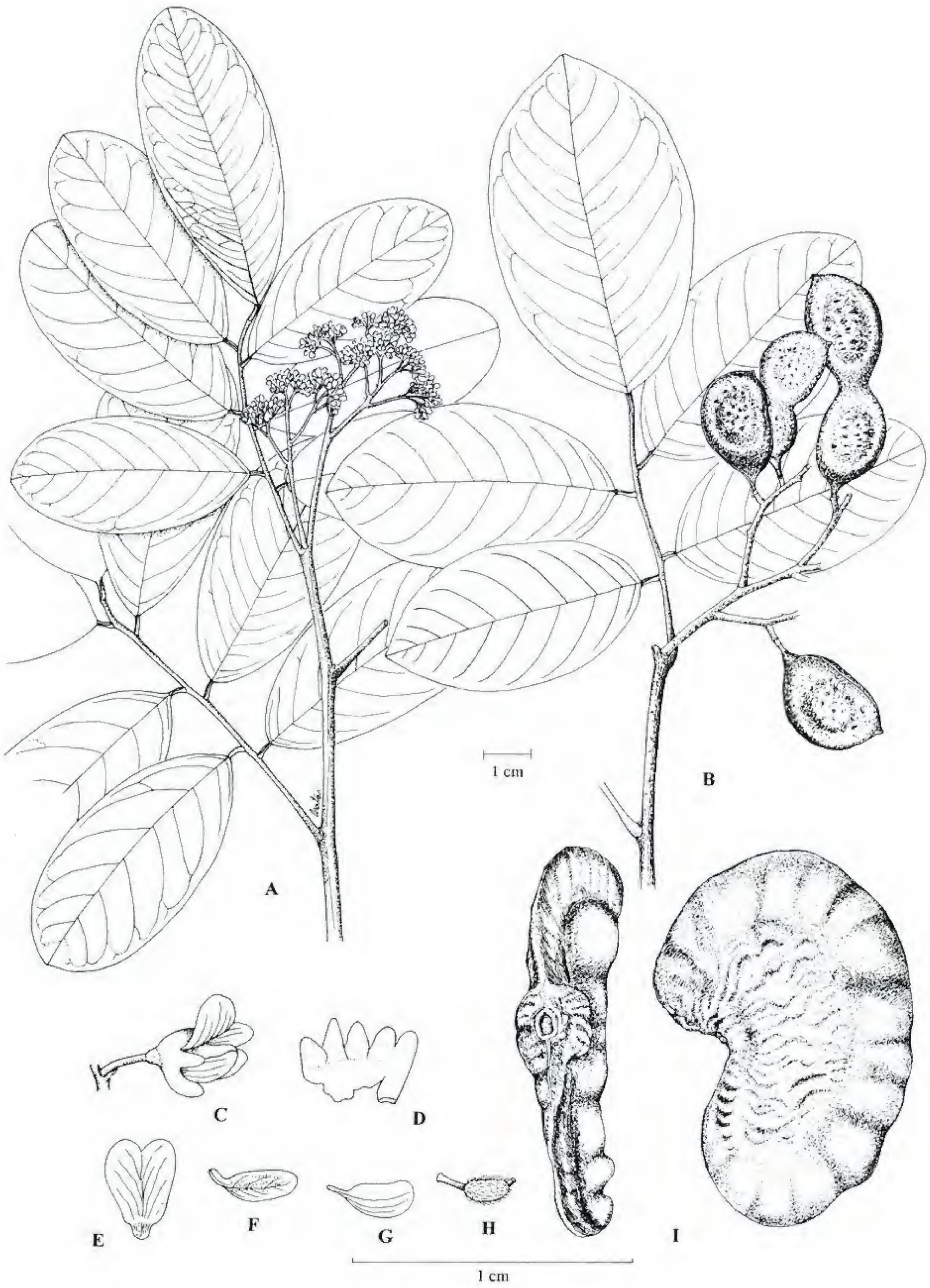

Figure 14. *Dalbergia parviflora* Roxb.: A. twig with leaves and inflorescence; B. twig with leaf and infructescence; C. flower; D. open calyx; E. standard petal; F. wing; G. keel; H. ovary; I. seeds.

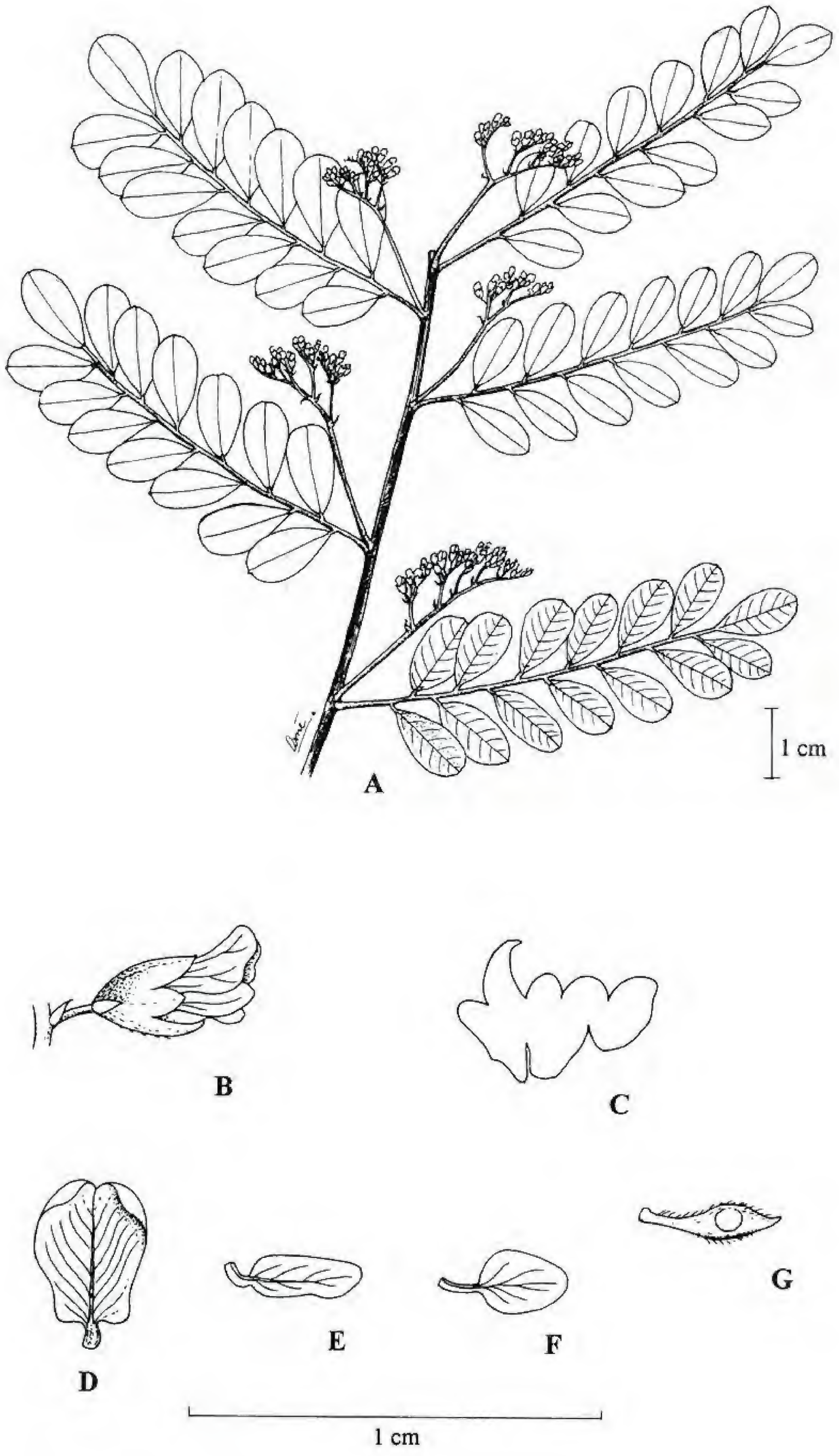

Figure 15. *Dalbergia phyllanthoides* Blume ex Miq.: A. twig with leaves and inflorescences; B. flower; C. open calyx; D. standard petal; E. wings; F. keel; G. ovary.

0.5 by 0.2 mm, persistent. *Bracteoles* elliptic, ca. 1 by 0.5 mm, persistent. *Pedicel* ca. 2 mm long. *Calyx* ca. 4 mm long, puberulous. *Corolla* creamy white to pale yellow; limb of standard petal orbicular, emarginate, ca. 1 by 2 mm, claw ca. 2.5 mm long; wings ca. 2 by 1 mm, claw ca. 2.5 mm long; keel ca. 2 by 1 mm, claw ca. 2.5 mm long. *Stamens* 9, in 1 bundle. *Ovary* glabrous; ovules 2. *Pod* oblong to linear oblong, 5–6 by 1.3 cm, 1(–2)-seeded. *Seeds* reniform, ca. 2 by 16 mm, reddish-brown.

Thailand.— SOUTH-WESTERN: Ratchaburi; SOUTH-EASTERN: Chon Buri; PENINSULAR: Ranong, Phangnga, Phuket, Krabi, Nakhon Si Thamarat, Satun, Pattani, Narathiwat.

Distribution.— India, Myanmar, Laos, Vietnam, Malaysia, Indonesia and The Philippines.

Ecology.— Along margins of mixed deciduous and evergreen forest, at low altitudes.

Vernacular.— Kham (ขาม), Kham khruea (ขามเครือ), Kham khruea lek (ขามเครือเล็ก) (Peninsular).

21. Dalbergia rimosa Roxb., Fl. Ind. 3: 233. 1832; Wight I.-C: t. 262. 1840; Benth., in Miq. Pl. Jungh. 2: 255. 1852 & J. Linn. Soc. 4, Suppl.: 32. 1860; Brandis, For, Fl. 148. 1874; Baker in Hook.f., Fl. Brit. Ind. 2: 232. 1876; Prain, J. As. Soc. Beng. 70(1): 61. 1901 & Ann. Roy. Bot. Gard. Calc. 10(1): 38, pl. 11. 1904; Gagnep., Fl. Gén. I.-C. 2: 474. 1916; Brandis, Ind. Trees: 233. fig. 100. 1921; Craib, Fl. Siam. Enum. 1: 483. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 12. 1997. Type: India, Sylhet, *Anon* s.n. (K!).— *D. discolor* Blume ex Miq., Fl. Ind. Bat. 1(1): 130. 1855; Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 36. pl. 10. 1904; Gagnep., l.c.: 473. 1916; Craib, l.c.: 476. 1928.— *D. curtisii* auct. non Prain: Gagnep., l.c.: 477. 1916; Craib, l.c.: 476. 1928.— *D. volubilis* Roxb. var. *latifolia* Gagnep., l.c.: 491. 1916. Fig. 17.

Scandent shrub up to 10 m high; young branches and inflorescence, pubescent. *Leaves* (10–) 15–20 cm long, 5–7(–9) leaflets; petioles 2–5 cm long; rachis 7–10 cm long, pubescent; stipules small, caducous. *Leaflets* elliptic-oblong to oblong-obovate, 4–10 by 2.5–5 cm; upper surface glabrescent, main nerves pubescent; lower surface pubescent; apex often rounded, emarginate or retuse sometimes acute or obtuse with a short mucronate tip; base obtuse to rounded; secondary nerves in 10–15 pairs, rathers close with subsidiary nerves; tertiary and reticulation distinct on both surfaces; petiolules 3–4 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 5–10 cm long. *Bracts* very small, reniform to orbicular, ca. 0.5 by 0.5 mm, caduous after anthesis. *Bracteoles* elliptic-oblong, ca. 1 by 0.5 mm, caducous after anthesis; pedicel ca. 0.5 mm long. *Calyx* ca. 3 mm long, puberulous. *Corolla* white; limb of standard petal obovate-emarginate, ca. 2.5 by 2.5 mm, claw ca. 0.7 mm long; wings ca. 2.5 by 1 mm, claw ca. 0.7 mm long; keel ca. 2 by 1 mm, claw ca. 0.7 mm long. *Stamens* 10, in 1 bundle. *Ovary* with a few hairs along upper suture and stipe; ovules 1–2. *Pod* oblong, 7–9 by 2–3.5 cm, glabrous, 1(–2)-seeded. *Seeds* reniform, ca. 16 by 27 mm, reddish-brown.

Thailand.— NORTHERN: Chiang Mai, Phrae.

Distribution.— India, Myanmar, China, Laos and Vietnam.

Ecology.— Open area in mixed deciduous and hill evergreen forest, 200–1300 m.

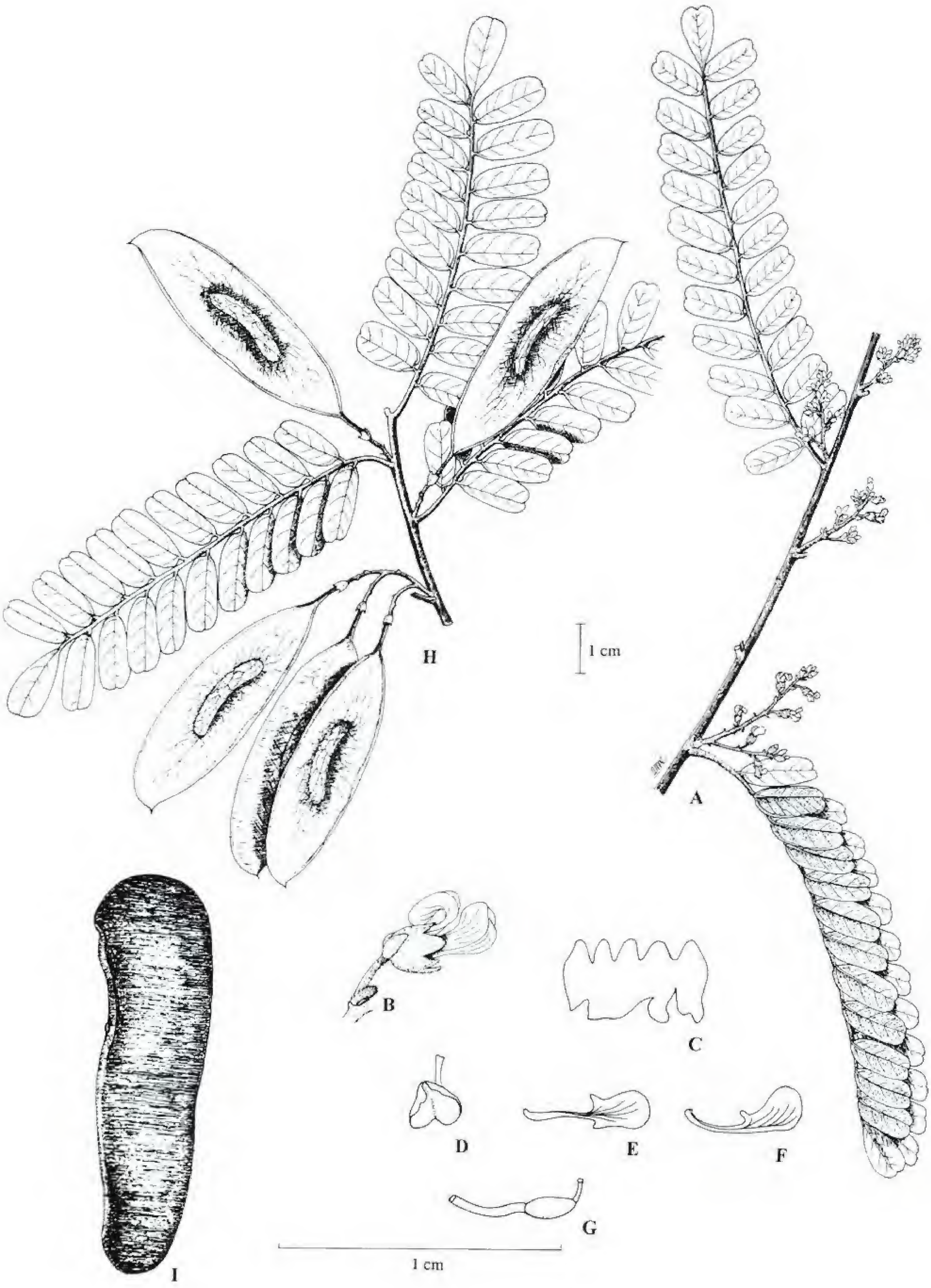

Figure 16. *Dalbergia pinnata* (Lour.) Prain : A. twig with leaves and inflorescences; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. twig with leaves and infructescences; I. seed.

Figure 17. *Dalbergia rimosa* Roxb.: A. twig with leaves and inflorescence; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. pod; I. seeds.

22. Dalbergia rostrata Grah. ex Prain, J. As. Soc. Beng. n.s.: 70(2): 45. 1901; Brandis, Ind. Trees: 234. 1921. Type: Sri Lanka, *Thwaites* 761 (K!). Fig. 18.

Scandent shrub up to 5 m high; young shoot and inflorescence puberulous to pubescent. *Leaves* 10–25 cm long, with 3–5 leaflets; petioles 1–2 cm long; rachis 2–5 cm long, puberulous; stipules small, caducous. *Leaflets* elliptic to elliptic-oblong, 5–12 by 3–7 cm; upper surface glabrous; lower surface glabrous to puberulous; apex abruptly acuminate; base obtuse to broadly cuneate; secondary nerves thin, in 5–7 pairs; tertiary nerves and reticulation distinct on lower surface; petiolules 4–5 mm long. *Inflorescence* a panicle, usually in leaf axils, sometimes subterminal, 3–5(–8) cm long. *Bracts* and bracteoles small, caducous. *Pedicel* ca. 2.5 mm long. *Calyx* ca. 5 mm long, puberulous. *Corolla* white; limb of standard petal broadly ovate to orbicular, emarginate, ca. 3 by 3 mm, claw ca. 2 mm long; wings ca. 4.5 by 2 mm, claw ca. 2.5 mm long; keel ca. 4 by 2 mm, claw ca. 2.5 mm long. *Stamens* 9, in 1 bundle. *Ovary* hairy; ovules 2. *Pod* oblong, falcate, 6–7.5 by 1.5–1.8 cm (immature), membranous, 1(–2)-seeded. *Seeds* reniform, ca. 15.5 by 7 mm, reddish-brown.

Thailand.— PENINSULAR: Ranong, Phangnga, Nakhon Si Thammarat, Satun, Songkhla.

Distribution.— India, Sri Lanka, Java, Malaysia and Borneo.

Ecology.— In open wet places along margins of evergreen forest, near sea level–800 m.

23. Dalbergia stipulacea Roxb., Fl. Ind. 3: 233. 1832; Wight, Ic. t. 243. 1840; Benth., in Miq., Pl. Jungh 2: 256. 1852, Miq., Fl. Ind. Bat. 1: 133. 1855; Benth., J. Linn., Soc. 4, Suppl.: 47. 1860; Baker, in Hook.f., Fl. Brit. Ind. 2: 237. 1876; Kurz, J. As. Soc. Beng. 45(4): 280. 1876 & For. Fl. Brit. Burma 1: 346. 1877; Prain, J. As. Soc. Beng. 66(2): 451. 1897 & ibid. 70: 55. 1901 & Ann. Roy. Bot. Gard. Calc. 10 (1): 102, pl. 87. 1904; Brandis, Ind. Trees: 238, fig. 104. 1877. Gagnep., Fl. Gén. I.-C. 2: 491. 1916; Craib, Fl. Siam. Enum. 1: 483. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 36. 1997. Type from India (Sylhet).

Scandent shrub, up to 5 m high; young shoot and inflorescence puberulous to pubescent. *Leaves* 15–25 cm long, with 15–25 leaflets; petioles 1–2.5 cm long; rachis 7–18 cm long, puberulous; stipules oblong, obtuse or rounded apex, 5–10 by 3–5 mm, early caducous. *Leaflets* oblong, the terminal one obovate, 2–5 by 1–1.5 cm; upper surface globrous to puberulous; lower surface puberulous; apex rounded to subemarginate; base cuneate, obtuse to rounded; secondary nerves very thin and fine, in 6–8 pairs, more distinct on the lower surface; petiolules 1–2 mm long. *Inflorescence* usually a panicle, rarely racemose, in leaf axils, 5–10 cm long. *Bracts* oblong, obtuse, ca. 5 by 2–2.5 mm, persistent. *Bracteoles* oblong, obtuse, ca. 4 by 1.5–2 mm, persistent. *Pedicel* ca. 3 mm long. *Calyx* ca. 7 mm long, glabrous to glabrescent or puberulous. *Corolla* blue to violet; limb of standard petals orbicular to reniform, ca. 5.5 by 7 mm, claw ca. 2 mm long; wings ca. 6 by 4 mm, claw ca. 1.5 mm long; keel ca. 4.5 by 3 mm, claw ca. 1.5 mm long. *Stamens* 10, in 2 lateral bundles of 5 + 5 or 6 + 4. *Ovary* hairy; ovules 2. *Pod* oblong, 7–12 by (2–)3.5–4.5 cm, glabrous or glabrescent. *Seeds* reniform, ca. 9.5 by 13.5 mm, dark brown.

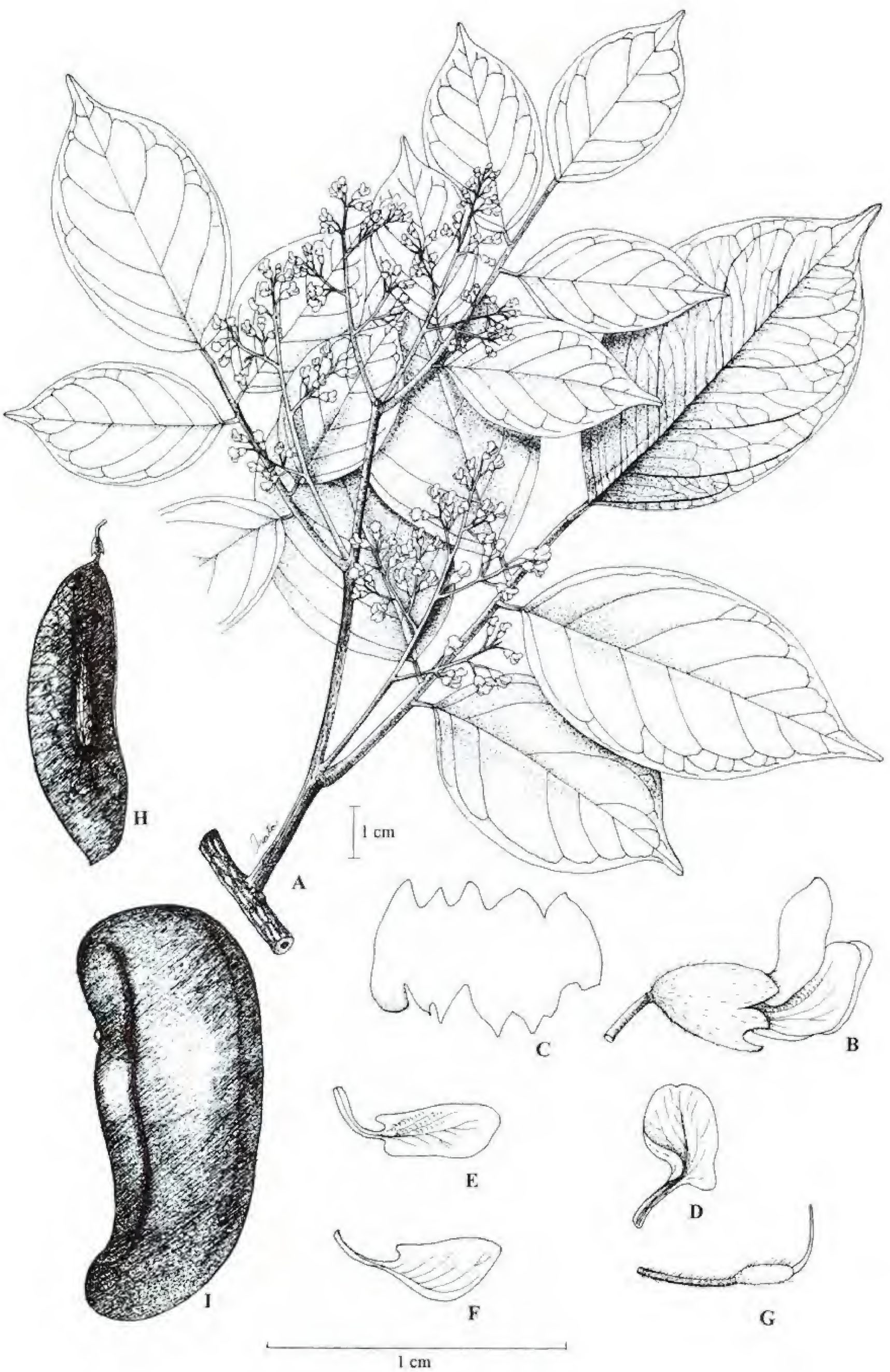

Figure 18. *Dalbergia rostrata* Grah. ex Prain: A. twig with leaves and inflorescences; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. pod; I. seed.

Thailand.— NORTHERN: Chiang Mai, Chiang Rai, Lampang, Phrae, Tak, Phitsanulok; NORTH-EASTERN: Loei, Nakhon Phanom, Kalasin; EASTERN: Nakhon Ratchasima; CENTRAL: Saraburi, Nakhon Nayok; SOUTH-EASTERN: Prachin Buri, Chanthaburi.

Distribution.— India, Myanmar, China (Yunnan), Cambodia, Laos and Vietnam.

Ecology.— Open thickets and along margin of mixed deciduous and hill evergreen forest, 100–1350 m.

Vernacular.— Kham khruea (ขามเครือ), khi mot (ขี้มอด), pi am (ปี้อ้ม), thao pidam (เถาปีดำ) (Chiang Mai); kom maep (คมแมบ) (Prachin Buri); kruea kra phi khao khwai (เครือกะพี้เขาควาย), ma kham khruea (มะขามเครือ) (Nong Khai, Chanthaburi); Taeng me (แตงเม), Mak-phaen (มักแฝ่น) (Yao-Chaing Mai).

24. Dalbergia suthepensis Niyomdham, Adansonia 18: 143, fig. 2: 1996. Type: Thailand, Chiang Mai, Doi Suthep, *Kerr* 2544 (BK!, K!).

Small tree; young shoot and inflorescence pubescent, later glabrescent. *Leaves* 15–20 cm long; with 11–15 leaflets; petioles 2–2.5 cm long; rachis 11–15 cm long; stipules linear-oblong, rounded at apex, ca. 2 by 0.5 cm, caducous. *Leaflets* oblong to ovate-oblong, 3–5 by 1.5–2 cm, the terminal one oblong obovate, 5–5.5 by 1.5–2 cm, glabrous on both surfaces; lateral nerves and reticulation thin and fine, not prominent; apex rounded to obtuse, subemarginate; petiolules 3–4 mm long. *Inflorescence* a panicle, terminal and in upper leaf axils, 10–12 cm long. *Bracts* and bracteoles small, very early caducous. *Pedicel* ca. 3 mm long, pubescent. *Calyx* ca. 5 mm long, glabrous. *Corolla* mauve; limb of standard petal broadly elliptic to orbicular, emarginate, ca. 9 by 8–9 mm, claw ca. 1.5 mm long; wings ca. 7 by 3.5 mm, claw ca. 2 mm long; keel, ca. 5.5 by 3 mm, claw ca. 2 mm long. *Stamens* 10, in 1 bundle. *Ovary* hairy; ovules 4. *Pod* elliptic to oblong-lanceolate, 7–9 by 3 cm, glabrous, 1–2 seeded. *Seeds* reniform, ca. 5 by 8 mm, reddish-brown.

Thailand.— Chiang Mai.

Distribution.— Endemic to Thailand.

Ecology.— Mixed deciduous forest, 1200 m.

25. Dalbergia velutina Benth., in Miq., Pl. Jungh. 2: 255. 1852 & J. Linn. Soc. 4, Suppl.: 43. 1860; Baker in Hook.f., Fl. Brit. Ind. 2: 233. 1876; Kurz, J. As. Soc. Beng. 45(4): 281. 1876 & For. Fl. Brit. Burma 1: 348. 1877; Prain, J. As. Soc. Beng. 66(1–2): 116, 445. 1897 & ibid. 70(1): 43. 1901 & Ann. Roy. Bot. Gard. Calc. 10(1) 74, pl. 55. 1904; Brandis, Ind. Trees: 234. 1921; Gagnep., Fl. Gén. I.-C. 2: 486. 1916; Ridl., Fl. Mal. Pen. 1: 592. 1922; Craib., Fl. Siam. Enum. 1: 484. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 48. 1997. Type: India, Sylhet, *Wallich* 5868B (K!).— *D. abbreviata* Craib, Kew Bull. 1926: 166. 1926 & Fl. Siam. Enum. 1: 473. 1928.— *D. pierreana* Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 72, pl. 52. 1904; Gagnep, Fl. Gén. I.-C. 2: 500. 1916. Fig. 19.

KEY TO THE VARIETIES

1. Limb of standard petal elliptic to oblong. Wing petals as long as or shorter than keel
  2. Wing petal as long as keel. Stipe of ovary hairy **b. var. velutina**
  2. Wing petals shorter than keel. Stipe of ovary glabrous **c. var. verrucosa**
1. Limb of standard petal orbicular-reniform. Wing petals longer than keel **a. var. succirubra**

25a. var. succirubra (Gagnep. & Craib) Niyomdham, Adansonia 18: 46. 1996; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 49. 1997.— *D. succirubra* Gagnep. & Craib, Kew Bull. 1915: 428. 1915; Gagnep., Fl. Gén. I.-C. 2: 484. 1916; Craib, Fl. Siam. Enum. 1: 483. 1928. Type: Thailand, Chiang Mai, Doi Suthep, *Kerr* 1682 (BK, K!).

Limb of standard petal orbicular-reniform, ca. 3 by 4 mm, claw ca. 2.5 mm long; wings ca. 3.5 by 1.5 mm, claw ca. 3 mm long; keel ca. 3 by 2 mm, claw ca. 3 mm long. *Ovary* and stipe glabrous. *Pod* 5–7.5 by 1.3–1.5 cm. *Seeds* reniform, ca. 4 by 16 mm, brown.

Thailand.— NORTHERN: Chiang Mai, NORTH-EASTERN: Phetchabun, Loei.

Distribution.— China, Laos and Vietnam.

Ecology.— Open areas in mixed deciduous and hill evergreen forest, 500–1500 m.

25b. var. velutina

Scandent shrub, or woody climber, up to 20 m long; young shoot and inflorescence densely ferrugineous-pubescent. *Leaves* 12–20 cm long, with 11–15(–19) leaflets; petioles 1.5–3 cm long; rachis 5–15 cm long, puberulous to pubescent; stipules linear, 10–15 by 3–4 mm, caducous. *Leaflets* oblong, 3–7.5 by 1.5–3 cm, pubescent to puberulous on both surfaces, rarely upper surface glabrous; apex rounded; base broadly cuneate to rounded; secondary nerves thin or sometimes rather obscure, 8–9 pairs; petiolules 2–4 mm long. *Inflorescence* a panicle, in leaf axils, (3–)4–10 cm long. *Bracts* oblong, obtuse, ca. 2 by 1 mm, persistent. *Bracteoles* linear-oblong, acute, ca. 1.5 by 0.2 mm, persistent. *Pedicel* ca. 2 mm long. *Calyx* ca. 5 mm long, densely pubescent. *Corolla* creamy white; limb of standard petal broadly elliptic, emarginate, ca. 4 by 3 mm, claw ca. 2.5 mm long; wings ca. 4 by 2 mm, claw ca. 3 mm long; keel ca. 4 by 2.5 mm, claw ca. 3 mm long. *Stamens* (9–)10, in 1 bundle. *Ovary* glabrous; stipe hairy; ovules 2–4. *Pod* oblong to linear-oblong, 5–6.5 by 1.8–2 cm, membranous, glabrous, 1–2-seeded. *Seeds* reniform, 7–8 by 17–20 mm, brown.

Thailand.— NORTHERN: Chiang Mai, Lampang; NORTH-EASTERN: Loei, Mukdahan; EASTERN: Chaiyaphum, Surin, Ubon Ratchathani; SOUTH-WESTERN: Kanchanaburi; CENTRAL: Saraburi; SOUTH-EASTERN: Chanthaburi, Trat; PENINSULAR: Ranong, Surat Thani, Phangnga, Trang, Satun, Nakhon Si Thammarat.

Distribution.— India, Bangladhesh, Myanmar, Laos, Cambodia, Vietnam, Malaysia and Borneo.

Ecology.— Along margins and in open areas in mixed deciduous and evergreen forest, 50–1300 m.

Vernacular.— Khruea khang khwai (เครือคางควาย) (Northeastern); khruea pi (เครือปี้) (Chiang Mai); tan khamoi (ตานขโมย) (Surat Thani); hang lai (หางไหล) (Trat).

25c. var. verrucosa (Craib) Niyomdham, Adansonia 18: 147. 1996.— *D. verrucosa* Craib, Kew Bull. 1927: 383. 1927 & Fl. Siam. Enum. 1: 484. 1928. Type: Thailand, Nan, Doi Phu Ka, *Kerr* 4930 (BK, K!).

Limb of standard petal elliptic-oblong, emarginate, ca. 3.5 by 3 mm, claw ca. 3 mm long; wings 3 by 1.5 mm, claw ca. 3 mm long; keel ca. 3.5 by 2.5 mm, claw ca. 3 mm long. *Ovary* and stipe glabrous.

Thailand.— NORTHERN: Nan.

Distribution.— Endemic to Thailand.

Ecology.— Hill evergreen forest, 1700 m.

26. Dalbergia volubilis Roxb., Pl. Coast. Corom. 2: 48, t. 191. 1798 & Hort. Beng. 53. 1814; DC., Prodr. 2: 417. 1825; Roxb., Fl. Ind. 3: 231. 1832; Wight & Arn., Prodr. Fl. Pen. Ind. Or.: 265. 1834; Baker in Hook.f., Fl. Brit. Ind. 2: 235. 1876; Kurz, For. Fl. Brit. Burma 1: 346. 1877; Prain, Ann. Roy. Bot. Gard. Calc. 10(1): 100, pl. 85. 1904; Gagnep., Fl. Gén. I.-C. 2: 490. 1916; Brandis, Ind. Trees: 237. 1921; Craib, Fl. Siam. Enum. 1: 484. 1928; Niyomdham, P.H. Hô & J.E. Vidal, Fl. C.L.V. 29: 15. 1997. Type: Roxburgh, Pl. Coast. Corom. 2: 48, t. 191 (1798). Fig. 20.

Scandent shrub or woody climber, up to 20 m long; young shoot and inflorescence densely pubescent, later glabrous. *Leaves* 7–18 cm long, with (9–)11–13 leaflets; petioles 1–3 cm long; rachis 5–13 cm long, glabrous to puberulous; stipules small, caducous. *Leaflets* ovate to elliptic-oblong, the terminal one obovate, 1.5–6 by 1–3.5 cm, glabrous on both surfaces; secondary nerves thin, in 10–12 pairs, distinct on both surfaces; tertiary nerves and reticulation more distinct on lower surface; apex obtuse, with a short mucronate tip, sometimes rounded, truncate or retuse; base obtuse to rounded. *Inflorescence* a panicle, terminal and in upper leaf axils, 10–20 cm long. *Bracts* and bracteoles elliptic-obtuse, ca. 1.5 by 1 mm, persistent. *Pedicel* ca. 5 mm long. *Calyx* ca. 4 mm long, puberulous. *Corolla* whitish, pale pink to pale violet; limb of standard petals orbicular-reniform, emarginate, ca. 4.5 by 6 mm, claw ca. 1.5 mm long; wings ca. 5 by 3 mm, claw ca. 1.5 mm long; keel ca. 4 by 2 mm, claw ca. 1.5 mm long. *Stamens* 10, in 2 lateral bundles of 5+5. *Ovary* hairy along the sutures and stipe; ovules 3–4. *Pod* oblong to linear-oblong, 6–7 by 2–2.5 cm, 1–2-seeded. *Seeds* reniform, ca. 8.5 by 4 mm, reddish-brown.

Thailand.— NORTHERN: Chiang Mai, Chiang Rai, Phrae, Tak; NORTH-EASTERN: Nakhon Phanom, Nong Khai; SOUTH-WESTERN: Kanchanaburi; CENTRAL: Saraburi; PENINSULAR: Surat Thani.

Distribution.— India, Sri Lanka, Bangladesh, Myanmar, Laos and Vietnam.

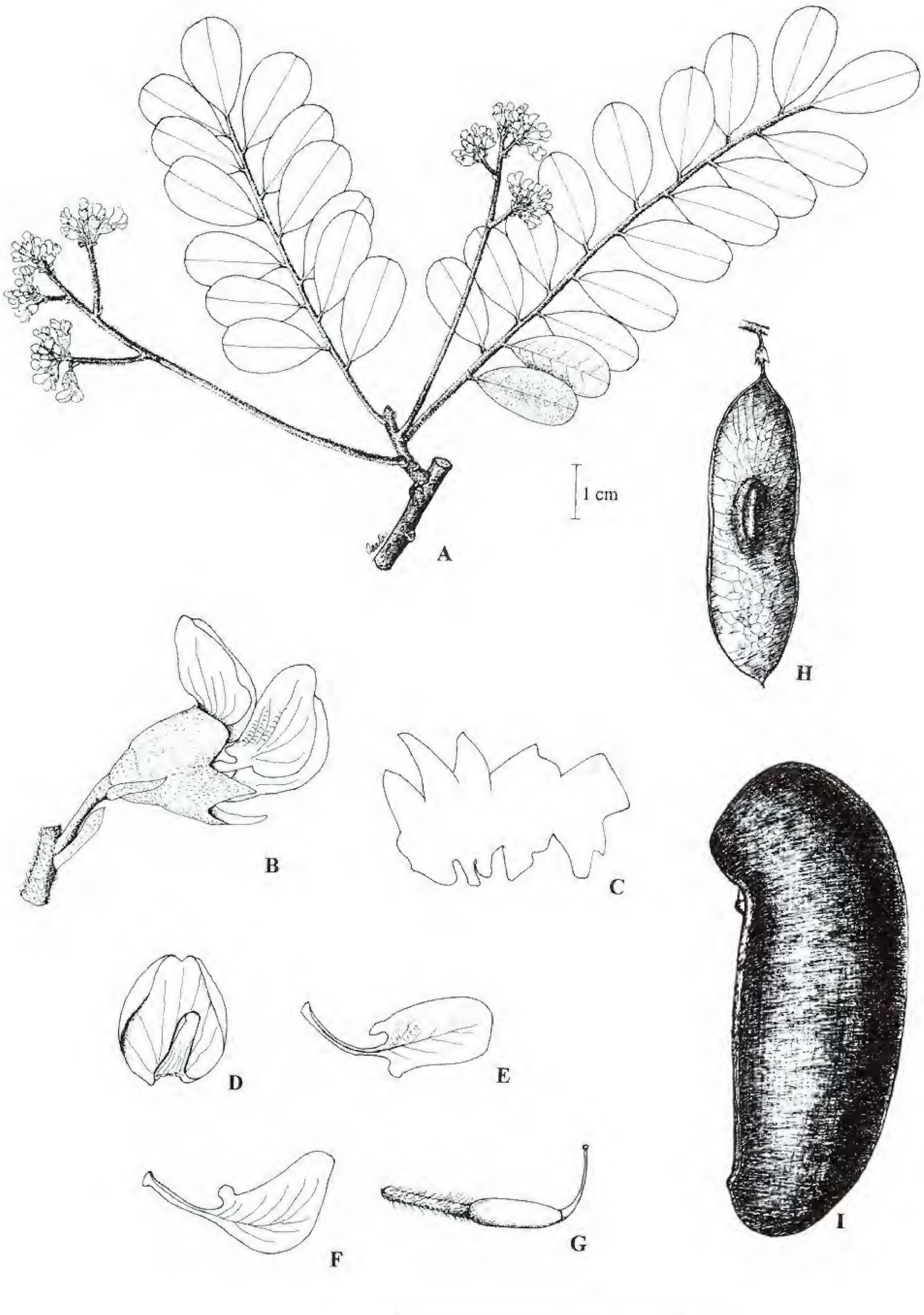

Figure 19. *Dalbergia velutina* Benth. var. *velutina*: A. twig with leaves and inflorescences; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. pod; I. seed.

Thailand.— NORTHERN: Chiang Mai, Chiang Rai, Phrae, Tak; NORTH-EASTERN: Nakhon Phanom, Nong Khai; SOUTH-WESTERN: Kanchanaburi; CENTRAL: Saraburi; PENINSULAR: Surat Thani.

Distribution.— India, Sri Lanka, Bangladesh, Myanmar, Laos and Vietnam.

Ecology.— Along margins of mixed deciduous forest, evergreen forest and hill evergreen forest, 100–1250 m.

Vernacular.— Khruea maet (เครือแมด), phi phong khruea (พี้พงเครือ) (Northern); krung khon (กรุงขน) (Nakhon Ratchasima); kam maet (กำแมด), khruea am ai (เครืออำไอ) (Nakhon Phanom); wo-wi (โว้วี้) (Karen-Kanchanaburi); ki Kum (คีกำ) (Suratthani).

Dalbergia sp. 1

A flowering specimen collected from Nakhon Ratchasima Province (Pak Thong Chai, Wang Nam Khieo *S. Phengnaren* 634 (BKF)) is a doubtful species related to *Dalbergia rubiginosa* Roxb. More material is needed to investigate it fully.

Figure 20. *Dalbergia volubilis* Roxb.: A. twig with leaves and inflorescence; B. flower; C. open calyx; D. standard petal; E. wing; F. keel; G. ovary; H. pod; I. seeds.